

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES	
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. <i>(If applicable)</i>	
6. ISSUED BY		CODE		7. ADMINISTERED BY <i>(If other than Item 6)</i>		CODE	
8. NAME AND ADDRESS OF CONTRACTOR <i>(No., street, county, State and ZIP Code)</i>				(X)		9A. AMENDMENT OF SOLICITATION NO.	
						9B. DATED <i>(SEE ITEM 11)</i>	
						10A. MODIFICATION OF CONTRACT/ORDER NO.	
						10B. DATED <i>(SEE ITEM 11)</i>	
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

- ☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
- (a) By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: <i>(Specify authority)</i> THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES <i>(such as changes in paying office, appropriation date, etc.)</i> SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER <i>(Specify type of modification and authority)</i>

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER <i>(Type or print)</i>		16A. NAME AND TITLE OF CONTRACTING OFFICER <i>(Type or print)</i>	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
<i>(Signature of person authorized to sign)</i>		<i>(Signature of Contracting Officer)</i>	

Item 14. Continued.

CHANGES TO DOCUMENTS 00 - INTRODUCTORY, BIDDING, AND CONTRACT REQUIREMENTS

1. Project Table of Contents: Replace the project table of contents with the accompanying new table of contents bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. W9126G-04-R-0046."

CHANGES TO THE SPECIFICATIONS

2. Replacement Sections: Replace the following Sections with the accompanying new sections of the same section number and title, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. W9126G-04-R-0046:"

01010 GENERAL PROJECT DESCRIPTION AND DESIGN REQUIREMENTS

3. New Volume: Add the following accompanying new Volume II RENOVATION WORK, Volume IIA DESIGN AND PERFORMANCE REQUIREMENTS, bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. W9126G-04-R-0046."

CHANGES TO APPENDICES

Appendix E, ELECTRICAL REQUIREMENTS: Replacement Electrical Attachments 16E and 29E with the following accompanying new attachments 16E and 29E, each bearing the notation "AM#4":

ATTACHMENT 16E SITES 28 & 29 (HAAF-700 BLK)

ATTACHMENT 29E COMMUNICATIONS SITES 28 & 29 (HAFF-700 BLK)

4. Appendix K – RELOCATABLE FACILITIES FUNCTIONAL REQUIREMENTS: Replace appendices K6 CLASSROOM and K12 STORAGE BUILDING with the accompanying new appendices K6 and K12, with the same titles, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0004 TO SOLICITATION NO. W9126G-04-R-0046."

CHANGES TO THE DRAWINGS

12. New Drawings: The new drawings listed below which accompany this amendment, bearing the notation "AM #0004," shall be added to and become a part of the contract documents:

a. Volume I (New Construction)

c32.cal C-32 SITE 31 – 4600 BLOCK

a114.cal A114 VAN DOCK & COMMO. BUILDING FLOOR PLAN

a115.cal A115 MODULAR GUARD HOUSE FLOOR PLAN

a116.cal A116 MAIL KIOSK FLOOR PLAN

a117.cal A117 COMMO NODE FLOOR PLAN

12. New Drawings: (cont)

b. Volume II (Renovation Work)

000G1.CAL		COVER SHEET - VOLUME IIB
001G1.CAL	Seq 1	G-001 INDEX OF DRAWINGS 1
002G2.CAL	Seq 2	G-002 INDEX OF DRAWINGS 2
003G3.CAL	Seq 3	G-003 PROJECT LOCATION MAP 1
004G4.CAL	Seq 4	G-004 PROJECT LOCATION MAP 2
005G5.CAL	Seq 5	G-005 PROJECT LOCATION MAP 3
006G6.CAL	Seq 6	G-006 GENERAL NOTES
007G7.CAL	Seq 7	G-007 ARCHITECTURAL NOTES
008G8.CAL	Seq 8	G-008 MECHANICAL NOTES
009G9.CAL	Seq 9	G-009 ELECTRICAL NOTES 1
010G10.CAL	Seq 10	G-010 ELECTRICAL NOTES 2
011G11.CAL	Seq 11	G-011 ELECTRICAL NOTES 3
012A1.CAL	Seq 12	A-101 BUILDING 4614 - ARCHITECTURAL DEMOLITION PLAN
013A2.CAL	Seq 13	A-102 BUILDING 4614 - PROPOSED ARCHITECTURAL PLAN
014M1.CAL	Seq 14	M-101 BUILDING 4614 - MECHANICAL DEMOLITION PLAN
015E1.CAL	Seq 15	E-101 BUILDING 4614 - ELECTRICAL DEMOLITION PLAN
016A1.CAL	Seq 16	A-101 BUILDING 4615 - ARCHITECTURAL DEMOLITION PLAN
017A2.CAL	Seq 17	A-102 BUILDING 4615 - PROPOSED ARCHITECTURAL PLAN
018A3.CAL	Seq 18	A-103 BUILDING 4615 - EXISTING BUILDING ELEVATIONS
019M1.CAL	Seq 19	M-101 BUILDING 4615 - MECHANICAL DEMOLITION PLAN
020M2.CAL	Seq 20	M-102 BUILDING 4615 - PROPOSED MECHANICAL PLAN
021E1.CAL	Seq 21	E-101 BUILDING 4615 - ELECTRICAL DEMOLITION PLAN
022E2.CAL	Seq 22	E-102 BUILDING 4615 - PROPOSED ELECTRICAL PLAN
023E3.CAL	Seq 23	E-103 BUILDING 4615 - ELECTRICAL ONE-LINE DIAGRAMS
024A1.CAL	Seq 24	A-101 BUILDING 4616 - ARCHITECTURAL DEMOLITION PLAN
025A2.CAL	Seq 25	A-102 BUILDING 4616 - PROPOSED ARCHITECTURAL PLAN
026A3.CAL	Seq 26	A-103 BUILDING 4616 - EXISTING BUILDING ELEVATIONS
027M1.CAL	Seq 27	M-101 BUILDING 4616 - MECHANICAL DEMOLITION PLAN
028M2.CAL	Seq 28	M-102 BUILDING 4616 - PROPOSED MECHANICAL PLAN
029E1.CAL	Seq 29	E-101 BUILDING 4616 - ELECTRICAL DEMOLITION PLAN
030E2.CAL	Seq 30	E-102 BUILDING 4616 - PROPOSED ELECTRICAL PLAN
031E3.CAL	Seq 31	E-103 BUILDING 4616 - ELECTRICAL ONE-LINE DIAGRAMS
032A1.CAL	Seq 32	A-101 BUILDING 4617 - ARCHITECTURAL DEMOLITION PLAN
033A2.CAL	Seq 33	A-102 BUILDING 4617 - PROPOSED ARCHITECTURAL PLAN
034A3.CAL	Seq 34	A-103 BUILDING 4617 - EXISTING BUILDING ELEVATIONS
035M1.CAL	Seq 35	M-101 BUILDING 4617 - MECHANICAL DEMOLITION PLAN
036M2.CAL	Seq 36	M-102 BUILDING 4617 - PROPOSED MECHANICAL PLAN
037E1.CAL	Seq 37	E-101 BUILDING 4617 - ELECTRICAL DEMOLITION PLAN
038E2.CAL	Seq 38	E-102 BUILDING 4617 - PROPOSED ELECTRICAL PLAN
039E3.CAL	Seq 39	E-103 BUILDING 4617 - ELECTRICAL ONE-LINE DIAGRAMS
040A1.CAL	Seq 40	A-101 BUILDING 9410 - ARCHITECTURAL DEMOLITION PLAN
041A2.CAL	Seq 41	A-102 BUILDING 9410 - PROPOSED ARCHITECTURAL PLAN
042M1.CAL	Seq 42	M-101 BUILDING 9410 - MECHANICAL DEMOLITION PLAN
043M2.CAL	Seq 43	M-102 BUILDING 9410 - PROPOSED MECHANICAL PLAN
044E1.CAL	Seq 44	E-101 BUILDING 9410 - ELECTRICAL DEMOLITION PLAN
045E2.CAL	Seq 45	E-102 BUILDING 9410 - PROPOSED ELECTRICAL PLAN
046E3.CAL	Seq 46	E-103 BUILDING 9410 - ELECTRICAL ONE-LINE DIAGRAMS
047A1.CAL	Seq 47	A-101 BUILDING 9413 - ARCHITECTURAL DEMOLITION PLAN
048A2.CAL	Seq 48	A-102 BUILDING 9413 - PROPOSED ARCHITECTURAL PLAN
049M1.CAL	Seq 49	M-101 BUILDING 9413 - MECHANICAL DEMOLITION PLAN

050M2.CAL Seq 50 M-102 BUILDING 9413 - PROPOSED MECHANICAL PLAN
 051E1.CAL Seq 51 E-101 BUILDING 9413 - ELECTRICAL DEMOLITION PLAN
 052E2.CAL Seq 52 E-102 BUILDING 9413 - PROPOSED ELECTRICAL PLAN
 053E3.CAL Seq 53 E-103 BUILDING 9413 - ELECTRICAL ONE-LINE DIAGRAMS
 054A1.CAL Seq 54 A-101 NOT USED
 055A2.CAL Seq 55 A-102 BUILDING 9418 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 056A3.CAL Seq 56 A-103 BUILDING 9418 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 057A4.CAL Seq 57 A-104 BUILDING 9418 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 058M1.CAL Seq 58 M-101 NOT USED
 059M2.CAL Seq 59 M-102 NOT USED
 060M3.CAL Seq 60 M-103 BUILDING 9418 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 061M4.CAL Seq 61 M-104 BUILDING 9418 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 062E1.CAL Seq 62 E-101 NOT USED
 063E2.CAL Seq 63 E-102 NOT USED
 064E3.CAL Seq 64 E-103 BUILDING 9418 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 065E4.CAL Seq 65 E-104 BUILDING 9418 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 066E5.CAL Seq 66 E-105 BUILDING 9418 - ELECTRICAL ONE-LINE DIAGRAMS
 067A1.CAL Seq 67 A-101 NOT USED
 068A2.CAL Seq 68 A-102 BUILDING 9419 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 069A3.CAL Seq 69 A-103 BUILDING 9419 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 070A4.CAL Seq 70 A-104 BUILDING 9419 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 071M1.CAL Seq 71 M-101 NOT USED
 072M2.CAL Seq 72 M-102 NOT USED
 073M3.CAL Seq 73 M-103 BUILDING 9419 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 074M4.CAL Seq 74 M-104 BUILDING 9419 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 075E1.CAL Seq 75 E-101 NOT USED
 076E2.CAL Seq 76 E-102 NOT USED
 077E3.CAL Seq 77 E-103 BUILDING 9419 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 078E4.CAL Seq 78 E-104 BUILDING 9419 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 079E5.CAL Seq 79 E-105 BUILDING 9419 - ELECTRICAL ONE-LINE DIAGRAMS
 080A1.CAL Seq 80 A-101 BUILDING 9420 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 081A2.CAL Seq 81 A-102 BUILDING 9420 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 082M1.CAL Seq 82 M-101 BUILDING 9420 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 083M2.CAL Seq 83 M-102 BUILDING 9420 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 084E1.CAL Seq 84 E-101 BUILDING 9420 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 085E2.CAL Seq 85 E-102 BUILDING 9420 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 086E3.CAL Seq 86 E-103 BUILDING 9420 - ELECTRICAL ONE-LINE DIAGRAMS
 087A1.CAL Seq 87 A-101 NOT USED
 088A2.CAL Seq 88 A-102 BUILDING 9421 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 089A3.CAL Seq 89 A-103 BUILDING 9421 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 090A4.CAL Seq 90 A-104 BUILDING 9421 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 091M1.CAL Seq 91 M-101 NOT USED
 092M2.CAL Seq 92 M-102 NOT USED
 093M3.CAL Seq 93 M-103 BUILDING 9421 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 094M4.CAL Seq 94 M-104 BUILDING 9421 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 095E1.CAL Seq 95 E-101 NOT USED
 096E2.CAL Seq 96 E-102 NOT USED
 097E3.CAL Seq 97 E-103 BUILDING 9421 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 098E4.CAL Seq 98 E-104 BUILDING 9421 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 099E5.CAL Seq 99 E-105 BUILDING 9421 - ELECTRICAL ONE-LINE DIAGRAMS
 100A1.CAL Seq 100 A-101 NOT USED
 101A2.CAL Seq 101 A-102 BUILDING 9422 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 102A3.CAL Seq 102 A-103 BUILDING 9422 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 103A4.CAL Seq 103 A-104 BUILDING 9422 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN

104M1.CAL Seq 104 M-101 NOT USED
 105M2.CAL Seq 105 M-102 NOT USED
 106M3.CAL Seq 106 M-103 BUILDING 9422 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 107M4.CAL Seq 107 M-104 BUILDING 9422 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 108E1.CAL Seq 108 E-101 NOT USED
 109E2.CAL Seq 109 E-102 NOT USED
 110E3.CAL Seq 110 E-103 BUILDING 9422 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 111E4.CAL Seq 111 E-104 BUILDING 9422 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 112E5.CAL Seq 112 E-105 BUILDING 9422 - ELECTRICAL ONE-LINE DIAGRAMS
 113A1.CAL Seq 113 A-101 NOT USED
 114A2.CAL Seq 114 A-102 BUILDING 9423 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 115A3.CAL Seq 115 A-103 BUILDING 9423 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 116A4.CAL Seq 116 A-104 BUILDING 9423 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 117M1.CAL Seq 117 M-101 NOT USED
 118M2.CAL Seq 118 M-102 NOT USED
 119M3.CAL Seq 119 M-103 BUILDING 9423 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 120M4.CAL Seq 120 M-104 BUILDING 9423 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 121E1.CAL Seq 121 E-101 NOT USED
 122E2.CAL Seq 122 E-102 NOT USED
 123E3.CAL Seq 123 E-103 BUILDING 9423 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 124E4.CAL Seq 124 E-104 BUILDING 9423 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 125E5.CAL Seq 125 E-105 BUILDING 9423 - ELECTRICAL ONE-LINE DIAGRAMS
 126A1.CAL Seq 126 A-101 NOT USED
 127A2.CAL Seq 127 A-102 BUILDING 9424 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 128A3.CAL Seq 128 A-103 BUILDING 9424 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 129A4.CAL Seq 129 A-104 BUILDING 9424 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 130M1.CAL Seq 130 M-101 NOT USED
 131M2.CAL Seq 131 M-102 NOT USED
 132M3.CAL Seq 132 M-103 BUILDING 9424 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 133M4.CAL Seq 133 M-104 BUILDING 9424 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 134E1.CAL Seq 134 E-101 NOT USED
 135E2.CAL Seq 135 E-102 NOT USED
 136E3.CAL Seq 136 E-103 BUILDING 9424 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 137E4.CAL Seq 137 E-104 BUILDING 9424 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 138E5.CAL Seq 138 E-105 BUILDING 9424 - ELECTRICAL ONE-LINE DIAGRAMS
 139A1.CAL Seq 139 A-101 NOT USED
 140A2.CAL Seq 140 A-102 BUILDING 9425 - PROPOSED BASEMENT ARCHITECTURAL PLAN
 141A3.CAL Seq 141 A-103 BUILDING 9425 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 142A4.CAL Seq 142 A-104 BUILDING 9425 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 143M1.CAL Seq 143 M-101 NOT USED
 144M2.CAL Seq 144 M-102 NOT USED
 145M3.CAL Seq 145 M-103 BUILDING 9425 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 146M4.CAL Seq 146 M-104 BUILDING 9425 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 147E1.CAL Seq 147 E-101 NOT USED
 148E2.CAL Seq 148 E-102 NOT USED
 149E3.CAL Seq 149 E-103 BUILDING 9425 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 150E4.CAL Seq 150 E-104 BUILDING 9425 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 151E5.CAL Seq 151 E-105 BUILDING 9425 - ELECTRICAL ONE-LINE DIAGRAMS
 152A1.CAL Seq 152 A-101 BUILDING 9426 - ARCHITECTURAL DEMOLITION PLAN
 153A2.CAL Seq 153 A-102 BUILDING 9426 - PROPOSED ARCHITECTURAL PLAN
 154M1.CAL Seq 154 M-101 BUILDING 9426 - MECHANICAL DEMOLITION PLAN
 155M2.CAL Seq 155 M-102 BUILDING 9426 - PROPOSED MECHANICAL PLAN
 156E1.CAL Seq 156 E-101 BUILDING 9426 - ELECTRICAL DEMOLITION PLAN
 157E2.CAL Seq 157 E-102 BUILDING 9426 - PROPOSED ELECTRICAL PLAN

158E3.CAL Seq 158 E-103 BUILDING 9426 - ELECTRICAL ONE-LINE DIAGRAMS
 000G2.CAL COVER SHEET - VOLUME IIC
 001G1.CAL Seq 1 G-001 INDEX OF DRAWINGS 1
 002G2.CAL Seq 2 G-002 INDEX OF DRAWINGS 2
 159A1.CAL Seq 159 A-101 BUILDING 9427 - ARCHITECTURAL DEMOLITION PLAN
 160A2.CAL Seq 160 A-102 BUILDING 9427 - PROPOSED ARCHITECTURAL PLAN
 161M1.CAL Seq 161 M-101 BUILDING 9427 - MECHANICAL DEMOLITION PLAN
 162M2.CAL Seq 162 M-102 BUILDING 9427 - PROPOSED MECHANICAL PLAN
 163E1.CAL Seq 163 E-101 BUILDING 9427 - ELECTRICAL DEMOLITION PLAN
 164E2.CAL Seq 164 E-102 BUILDING 9427 - PROPOSED ELECTRICAL PLAN
 165E3.CAL Seq 165 E-103 BUILDING 9427 - ELECTRICAL ONE-LINE DIAGRAMS
 166A1.CAL Seq 166 A-101 BUILDING 10001 - FIRST FLOOR ARCHITECTURAL DEMOLITION
 PLAN
 167A2.CAL Seq 167 A-102 BUILDING 10001 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 168M1.CAL Seq 168 M-101 BUILDING 10001 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 169M2.CAL Seq 169 M-102 BUILDING 10001 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 170E1.CAL Seq 170 E-101 BUILDING 10001 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 171E2.CAL Seq 171 E-102 BUILDING 10001 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 172E3.CAL Seq 172 E-103 BUILDING 10001 - ELECTRICAL ONE-LINE DIAGRAMS
 173A1.CAL Seq 173 A-101 BUILDING 10002 - FIRST FLOOR ARCHITECTURAL DEMOLITION
 PLAN
 174A2.CAL Seq 174 A-102 BUILDING 10002 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 175M1.CAL Seq 175 M-101 BUILDING 10002 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 176M2.CAL Seq 176 M-102 BUILDING 10002 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 177E1.CAL Seq 177 E-101 BUILDING 10002 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 178E2.CAL Seq 178 E-102 BUILDING 10002 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 179E3.CAL Seq 179 E-103 BUILDING 10002 - ELECTRICAL ONE-LINE DIAGRAMS
 180A1.CAL Seq 180 A-101 BUILDING 10003 - FIRST FLOOR ARCHITECTURAL DEMOLITION
 PLAN
 181A2.CAL Seq 181 A-102 BUILDING 10003 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 182M1.CAL Seq 182 M-101 BUILDING 10003 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 183M2.CAL Seq 183 M-102 BUILDING 10003 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 184E1.CAL Seq 184 E-101 BUILDING 10003 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 185E2.CAL Seq 185 E-102 BUILDING 10003 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 186E3.CAL Seq 186 E-103 BUILDING 10003 - ELECTRICAL ONE-LINE DIAGRAMS
 187A1.CAL Seq 187 A-101 BUILDING 10004 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 188A2.CAL Seq 188 A-102 BUILDING 10004 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 189M1.CAL Seq 189 M-101 BUILDING 10004 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 190M2.CAL Seq 190 M-102 BUILDING 10004 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 191E1.CAL Seq 191 E-101 BUILDING 10004 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 192E2.CAL Seq 192 E-102 BUILDING 10004 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 193E3.CAL Seq 193 E-103 BUILDING 10004 - ELECTRICAL ONE-LINE DIAGRAMS
 194A1.CAL Seq 194 A-101 BUILDING 10005 - FIRST FLOOR ARCHITECTURAL DEMOLITION
 PLAN
 195A2.CAL Seq 195 A-102 BUILDING 10005 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 196M1.CAL Seq 196 M-101 BUILDING 10005 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 197M2.CAL Seq 197 M-102 BUILDING 10005 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 198E1.CAL Seq 198 E-101 BUILDING 10005 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 199E2.CAL Seq 199 E-102 BUILDING 10005 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 200E3.CAL Seq 200 E-103 BUILDING 10005 - ELECTRICAL ONE-LINE DIAGRAMS
 201A1.CAL Seq 201 A-101 BUILDING 10006 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 202A2.CAL Seq 202 A-102 BUILDING 10006 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 203M1.CAL Seq 203 M-101 BUILDING 10006 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 000G3.CAL COVER SHEET - VOLUME IID

001G1.CAL Seq 1 G-001 INDEX OF DRAWINGS 1
 002G2.CAL Seq 2 G-002 INDEX OF DRAWINGS 2
 204M2.CAL Seq 204 M-102 BUILDING 10006 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 205E1.CAL Seq 205 E-101 BUILDING 10006 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 206E2.CAL Seq 206 E-102 BUILDING 10006 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 207E3.CAL Seq 207 E-103 BUILDING 10006 - ELECTRICAL ONE-LINE DIAGRAMS
 208A1.CAL Seq 208 A-101 BUILDING 10007 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 209A2.CAL Seq 209 A-102 BUILDING 10007 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 210M1.CAL Seq 210 M-101 BUILDING 10007 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 211M2.CAL Seq 211 M-102 BUILDING 10007 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 212E1.CAL Seq 212 E-101 BUILDING 10007 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 213E2.CAL Seq 213 E-102 BUILDING 10007 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 214E3.CAL Seq 214 E-103 BUILDING 10007 - ELECTRICAL ONE-LINE DIAGRAMS
 215A1.CAL Seq 215 A-101 BUILDING 10008 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 216A2.CAL Seq 216 A-102 BUILDING 10008 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 217M1.CAL Seq 217 M-101 BUILDING 10008 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 218M2.CAL Seq 218 M-102 BUILDING 10008 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 219E1.CAL Seq 219 E-101 BUILDING 10008 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 220E2.CAL Seq 220 E-102 BUILDING 10008 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
 221E3.CAL Seq 221 E-103 BUILDING 10008 - ELECTRICAL ONE-LINE DIAGRAMS
 222A1.CAL Seq 222 A-101 BUILDING 10009 - FIRST FLOOR ARCHITECTURAL DEMOLITION PLAN
 223A2.CAL Seq 223 A-102 BUILDING 10009 - PROPOSED FIRST FLOOR ARCHITECTURAL PLAN
 224M1.CAL Seq 224 M-101 BUILDING 10009 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
 225M2.CAL Seq 225 M-102 BUILDING 10009 - PROPOSED FIRST FLOOR MECHANICAL PLAN
 226E1.CAL Seq 226 E-101 BUILDING 10009 - FIRST FLOOR ELECTRICAL DEMOLITION PLAN
 227E2.CAL Seq 227 E-102 BUILDING 10009 - PROPOSED FIRST FLOOR ELECTRICAL PLAN
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13. Replacement Drawings.- Replace the drawings listed below with the attached new drawings(s) of the same number, bearing the notation "AM #0004":

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(AM #0002)

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(AM #0002)

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 13284F REMOVAL, RECYCLING AND DISPOSAL OF REGULATED MATERIALS
 13805 ONE-WAY FREQUENCY MODULATION (FM) UTILITY MANAGEMENT & CONTROL
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SECTION 01010

GENERAL PROJECT DESCRIPTION AND DESIGN REQUIREMENTS
AMENDMENTS NO. 0002 and 0004

1. GENERAL

1.1 The Contractor shall design and construct the Design-Build Miscellaneous Construction, Renovation, & Alteration Projects at Fort Hood, Texas resulting in complete and useable facilities.

1.2 Scope of Work

1.2.1 Renovations

The design and construction for the renovation of 45 existing buildings as outlined in following documents. Scope of renovations varies from minor refurbishing to complete building restoration in accordance with current safety, fire, and anti-terrorism force protection standards, as further described in the following documents.

1.2.2 Site Improvements

Site improvements include the design and construction of roadways, parking, and hardstand areas both as repair of existing and new construction. Design and construction covers clearing and grubbing, aggregate base course, bituminous base course, asphalt surface overlays, concrete hardstand, pavement markings, traffic control signage, sidewalks, storm drainage, area lighting, security fencing, and erosion control.

1.2.3 New Facility Construction

(AM#2) New Construction includes The design and construction of both relocatable and permanent structures **(AM#2) for** ~~to provide~~ administration, classroom, storage, and maintenance **(AM#2) use facilities**. The buildings shall be complete with water, sewer, electrical, gas service, fire alarm systems, **(AM#2) fire suppressions systems, and** communication and information systems **(AM#2) as required and** as further detailed in the following documents. The scope also includes utility design for sewer, water, gas, and electric from the point of connection to the identified facilities. Supporting facilities will include site related hardstand and pavement repair and construction, security fencing and lighting, sidewalks, storm drainage, and erosion control measures.

1.2.4 Furnishings

The interior design, procurement, and installation of furnishings for renovated and newly constructed buildings as further detailed in this RFP.

1.2.5 Personal Property Relocation

The scope of this Contract includes the packing, transporting, and unpacking of various personal property items involved in the relocation of approximately 3000 personnel with approximately 1500 pounds of property per person. Transport distances of up to twenty miles are to be anticipated. Contractor will be responsible for video taped documentation of property condition at pick-up and delivery points, preparation of property inventory, and liability insurance to cover loss and damage.

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1.3 Site locations

Specific project locations are shown on the site location drawings C-01 and C-02 or identified by Fort Hood building number.

1.4 Site Development and Utilities

Site development will include all clearing and grubbing and grading, pavement repairs, storm drainage, and utilities to support the facilities. Rudimentary drawings included in this RFP include site locations with the approximate site layout indicated and the proposed scope of work indicated. These drawings are included for design and coordination purposes **(AM#2) only. It is the Contractor's responsibility to develop complete site designs as needed to construct the project.** Further development of this design will require coordination with the using agency and base personnel. Revisions and refinements to these rudimentary drawings, or any other drawings and plans developed as a result of this proposal, should be expected during the course of design development until final design is achieved.

1.5 Demolition

Demolition will be as specified for each individual project site. Demolition for some building renovations involves hazardous material abatement as detailed further in the documents specific to those facilities. **(AM #0002) For submittal of a non-hazardous solid waste disposal plan, reference Section 01355 ENVIRONMENTAL PROTECTION, paragraph 1.7.2 Content, and a Waste Diversion Report reference SECTION 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT and the Fort Hood Environmental Standard Operating Procedures (IMMU-SOP) in Section 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD.**

1.6 Army Standard Designs

There are no Army Standard Designs for this project.

2. DESIGN CRITERIA

2.1 Codes, reference documents and criteria referenced within this RFP, although not attached, are an integral part of this RFP. Each offeror is responsible for securing any necessary reference at the Offeror's own expense and resources. Requirements of this RFP may delete, revise, add to, or substitute for criteria contained in the referenced documents and this RFP shall be deemed the controlling authority of any changes to referenced documents and criteria.

2.2 Information provided in the appendices is intended to provide additional design requirements and information.

2.3 Concept Layout Drawings

Concept layout (one-line) drawings are included for design and coordination purposes. Further development of this design will require coordination with the using agency and base personnel. Revisions and refinements to these concept drawings, or any other drawings and plans developed as a result of this proposal, should be expected during the course of design development until final design is achieved.

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3. SPECIFICATION INTENT

The intent of these RFP specification sections is to describe the requirements for quality, function, and materials, and types of construction in sufficient detail to enable engineering and design to be completed by the Contractor. In this specification section, each engineering and design discipline describes design intent and outlines the parameters to which the Contractor shall design.

4. COORDINATION

4.1 The Contractor is responsible for the coordination between design, engineering, and construction disciplines in order to fulfill the requirements of this contract and to provide for a complete, integrated and functional design.

4.2 On-Site Design

The Contractor shall provide on-site design staff and perform design preparation on-site to the maximum extent possible to facilitate communications between the using agencies, the Contracting Officer's Representatives, and the Contractor's construction forces.

5. SUBMITTALS AND DESIGN REVIEW

Design review and approval under this Contract shall be managed on a fast-track basis. Each design submission must be complete and legible to facilitate review and approval. Design points of contact and locations for document delivery will be established at the pre-construction meeting. See Section 01012 DESIGN AFTER AWARD.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings

Shop drawings shall be provided with design submissions for simultaneous review with the proposed design.

SD-03 Product Data

Product Data

Product data to help describe facilities, systems, and equipment shall be provided with design submissions.

SD-04 Samples

SID and CID; G

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SID and CID submittals, as described in this Section and in Section 01016 DESIGN DOCUMENT REQUIREMENTS, and including but not limited to color/finish sample boards, shall be part of the design submissions.

SD-05 Design Data

Design Data

Submit all design calculations, mix designs, analyses, surveys, and geotechnical reports as developed during design to the Central Texas Area Office. Provide design calculations signed and stamped by a registered structural or geotechnical engineer as appropriate demonstrating that foundations provided for each building will meet the requirements of the Contract.

SD-06 Test Reports

Test Reports

Submit all test reports applicable to the project to the Central Texas Area Office.

SD-07 Certificates

Certificates

(AM #0002) Buy American Act Certification

Asbestos-Free Construction Material (AM #0002) (listed in paragraph Asbestos Construction Materials)

Builders Hardware and Keying Schedules

(AM #0002) Low-Emitting and Non-hazardous Construction Materials (see paragraph Low-Emitting and Non-hazardous Construction Materials)

Submit all certifications applicable to the project. Provide a letter of certification signed and stamped by a registered structural engineer indicating that each individual building meets the structural provisions of the criteria specified in this Contract.

SD-09 Manufacturer's Field Reports

Field Reports

Submit all field reports applicable to the project to the Central Texas Area Office.

SD-10 Operation and Maintenance Data

Operation and Maintenance Data

Submit operation and maintenance data for all appliances and equipment. Assemble in separate binders by building number (i.e. one binder for all barracks is acceptable if appliances and equipment are the same for all barracks).

6. CONSTRUCTION ELEMENTS AND PRODUCTS

Furnish elements, assemblies, materials, and products that comply with the Contract requirements so that the finished facilities perform as specified. The actual construction shall comply with the specified requirements and may,

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at the Government's discretion, be examined, inspected, or tested to determine compliance. Furnish submittals during the design phases and during construction as specified below. See Division 1 Sections 01012 DESIGN REQUIREMENTS AFTER AWARD and 01330 CONSTRUCTION SUBMITTAL PROCEDURES for submittal requirements and definitions of "approved" and "accepted" submittals.

Materials, products, and assemblies shall conform to the Contract Specifications. Select in accordance with the following:

a. Where a product is specified only by a manufacturer name and model number/brand name, select in accordance with the Contract Clause 52.236-5 MATERIAL AND WORKMANSHIP. If the Buy American Act is specifically exempted for this product, use only that model/brand product.

b. Where the properties of a product are specified by description and/or with performance criteria, use products that comply with the description and/or performance criteria.

c. Where multiple manufacturers are listed for a particular product, use a product made by one of those manufacturers or any other manufacturer in accordance with the Contract Clause 52.236-5 MATERIAL AND WORKMANSHIP.

d. Where assemblies, products, types of products, or performance criteria are not specified, use products and assemblies that will perform well within the specified life span of the building. Furnish manufacturers' product literature, shop drawings, test reports, and/or certifications as required to verify the products meet Contract requirements.

e. Buy American Act: Furnish a separate certificate of compliance attesting that builders' hardware items and other products conform to the Section 00700 Contract clauses pertaining to the Buy American Act.

f. Gypsum Board Products: Submit certification that gypsum board products, such as gypsum wallboard, gypsum backing board, cementitious backer units, and joint treating materials do not contain asbestos.

g. Submit Certificates of Proof on construction products, such as sealants and joint compounds, are free of asbestos-containing materials.

h. Builders' Hardware:

(1) All hardware, including hinges, closers, locksets, exit devices, door hold open devices, and door stops, shall be grade 1 in accordance with the Builders Hardware Manufacturers Association ANSI/BHMA Standards. Pins on the closer arms shall not be removable except with a tool.

(2) Lock Trim: Lock trim shall be cast, forged, or heavy wrought construction of commercial plain design. In addition to meeting the test requirement of BHMA A156.13, knobs, lever handles, roses, and escutcheons shall be 0.050 inch (1.27mm) thick, if unreinforced. If reinforced, the outer shell shall be 0.035 inch (0.89 mm) thick and the combined thickness shall be 0.070 inch (1.78 mm) except that knob shanks shall be 0.060 inch (1.52 mm) thick. Knob diameter shall be 2-1/8 to 2-1/4 inches (54 to 57 mm). Lever handles shall be of plain design with ends returned to no more than 1/2 inch (10 mm) from the door face.

(3) Lock Cylinders and Cores (Mortise, Rim and Bored)

(a) Lock cylinders shall comply with BHMA A156.5. Lock cylinder shall have not less than seven pins.

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(b) Locks and cylinders shall have key removable type cores matching the keying system of the existing building.

(c) Disassembly of knob or lockset shall not be required to remove core from lockset.

(d) All locksets, lockable exit devices, and padlocks shall accept the same interchangeable cores.

(e) Provide a master keying system.

(f) Provide a construction master keying system.

(1) Furnish with construction interchangeable cores.

(2) Use the manufacturer's standard construction key system.

(g) Keying: Locks shall be keyed in sets or subsets. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." The keys shall be furnished to the Contracting Officer arranged in a container in sets or subsets as scheduled.

(1) Keys shall be supplied as follows:

(2) Locks: 5 change keys each lock.

(3) Master keyed sets: 3 keys each set, where required.

(4) Control keys: [6][_] total.

(5) Construction keys: 6 total.

(6) Blank keys: 50 per key blank.

(4) During construction, furnish:

(a) Hardware and Accessories: Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices, closers, electric locks, electric strikes, electro-magnetic closer holder release devices, and electric exit devices, after approval of the detail drawings, and not later than 3 months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.

(b) Hardware Schedule: Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; lock trim material thicknesses; lock trim material evaluation test results; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

(c) Keying Schedule: Keying schedule developed in accordance with DHI Keying Systems, after the keying meeting with the user.

(d) Certificates of Compliance: The hardware manufacturer's certificates of compliance stating that the supplied material or hardware item meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of the product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. A statement that the proposed hardware items appear in BHMA L & R Directory, BHMA Closer Directory and BHMA Exit Devices Directory directories of certified products may be submitted in lieu of certificates.

7. DESIGN REQUIREMENTS

7.1 General

7.1.1 All work under this Contract shall be designed and constructed in accordance with the criteria contained herein using industry standard materials and efficient practices. The Contractor shall use materials and equipment allowed under the criteria cited in this Contract or acceptable

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under commercial standard practice where no specific criteria is provided. The building design and the materials selected shall be of high quality, durable, and easily maintained.

7.1.2 The Contractor shall prepare complete construction documents for all work designed as required by the Contract. The Contractor's Designers of Record shall develop construction document technical specifications for all areas of work. See Sections 01012 DESIGN AFTER AWARD and 01016 DESIGN DOCUMENT REQUIREMENTS.

7.1.3 The Contractor shall be responsible for the professional quality, code compliance, technical accuracy, and coordination of all designs, drawings, specifications and other documents or publications upon which the design and construction are based. See Section 01012 DESIGN AFTER AWARD for additional requirements.

8. DESIGN AND TECHNICAL CRITERIA

All designs and construction document drawings and specifications shall be prepared to comply with the Contract Documents. Deviations from the criteria will not be allowed unless prior approval is obtained from the Contracting Officer. All questions or problems encountered by the Contractor in the criteria shall be promptly submitted with recommendations to the Contracting Officer for approval.

8.1 ENGLISH OR METRIC DESIGN

The design shall be developed using English units of measure.

9. BUILDING CODES AND STANDARDS

Make all portions of the project comply with all applicable local, State, and Federal codes and regulations, including those listed below. This list is not intended to be a complete list. The "authority having jurisdiction," as cited in codes, standards, or references will be the Contracting Officer.

9.1 Conflict and Inconsistencies

In the event of conflict and inconsistency between any of the provisions of the various codes, standards, or references, precedence shall be given in the following order:

a) Contract requirements

1) The code, standard, or reference that is listed in the Contract design or performance requirement;

2) When conflict exists between references, the more stringent requirement shall govern;

3) Where a particular design aspect is not covered by any of the codes, standards, or references listed, nor by the requirements specified in the Contract, the Contractor shall be guided by other nationally recognized and accepted codes or standards which do apply;

b) Fort Hood Installation Design Guide and Technical Supplement to the Design Guide for Fort Hood.

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c) Southwestern Division's Architectural and Engineering Instructions Manual (AEIM)

d) Technical and Engineering Manuals, Instructions, Letters, Design Guides, Engineer Regulations, Pamphlets, and Bulletins.

e) Industry Standards and Regulations

9.2 Federal Regulatory Requirements

a) Public Law (P.L.) 91-190, National Environmental Policy Act, as amended 1969 (See additional Federal Regulation references in Chapter XII ENVIRONMENTAL DESIGN of COE SWD-AEIM (item H), Volume IV ATTACHMENTS.

b) 29 CFR 1910 Occupational Safety and Health Standards (AM #0002), 29 CFR 1926 Safety and Health Regulations for Construction, and other references as stated in SECTIONS 13280 ASBESTOS ABATEMENT, 13282 METALS ENCOUNTERED IN PAINT DUST DURING CONSTRUCTION, and 13284 REMOVAL, RECYCLING AND DISPOSAL OF REGULATED MATERIALS.

c) P.L. 93-205, Endangered Species Act, as amended 1973

d) UFC 3-600-01 Design: Fire Protection Engineering For Facilities

e) U.S. Environmental Protection Agency (EPA), National Pollution Discharge Elimination System (NPDES) Storm Water Construction Permit in accordance with Federal register, Volume 63, Number 128, July 6, 1998.

f) Not Used.

f) P.L. 95-515, National Historic Preservation Act, as amended 1980.

g) P.L. 96-95, Archaeological Resources Protection Act of 1979.

h) Executive Order (E.O.) 11593, Protection and Enhancement of the Cultural Environment.

i) E.O. 11990, Protection of Wetlands.

j) Clean Air Act, as amended 1990.

k) Clean Water Act, as amended 1990.

l) Oil Pollution Act, 1990 and 40 CFR Part 112, Oil Pollution Prevention and Response.

m) 40 CFR Part 82, Protection of Stratospheric Ozone.

n) 42 CFR Part 116, Emergency Planning and Community Right-To-Know

o) Pollution Prevention Act of 1990.

p) Resource Conservation Recovery Act, as amended 1986.

q) DoD Anti-Terrorism/Force Protection Minimum Standards

r) (AM #0002) TI 809-29, Structural Considerations for Metal Roofing (Aug.

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- s) (AM #0002) TI 809-07, Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls (Nov. 98)
- t) (AM #0002) TI 809-04, Seismic Design for Buildings (Dec. 98)
- u) (AM#2) TI 809-02, Structural Design Criteria for Buildings (Sept. 99)
- v) (AM#2) UFC 1-200-01, General Building Requirements (July 02)
- w) (AM #0002) UFC 3-310-01, Load Assumptions for Buildings (Aug. 98)

9.3 State of Texas regulatory requirements, (AM #0002) Texas Commission on Environmental Quality (TCEQ) ~~Texas Natural Resource Conservation Commission (TNRCC)~~

a) Air emission in accordance with 30 Texas Administrative Code (TAC) 116.111 and 30 TAC 106

b) Underground and Aboveground Storage Tanks per 30 TAC 334

c) Erosion and sedimentation control regulations, see Texas Pollutant Discharge Elimination System (TPDES) (AM #0002) ~~Construction~~ Storm Water (AM #0002) Construction General Permit TXR 150000 and Section 01421 OUTLINE OF A BASIC STORM WATER POLLUTION PREVENTION PLAN, Volume III SPECIFICATIONS.

d) (AM #0002) Water distribution systems in accordance with 30 TAC 290.44; disinfection of new and repaired water distribution facilities in accordance with 30 TAC 290.44 and 290.46; and customer service inspections in accordance with 30 TAC 290.46 and 290.47.

e) (AM #0002) Design criteria for sewerage systems in accordance with 30 TAC 317, especially 317.2 on sewerage collection systems and 317.3 on lift stations.

9.4 Non-Regulatory Criteria Documents

In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Government.

a) NFPA 10, Portable Extinguishers

b) NFPA 70, National Electrical Code.

c) NFPA 80, Fire, Doors and Windows

d) NFPA 101, Safety to Life From Fire in Buildings and Structures.

e) ICC 867 ICC International Fire Code.

f) ICC 861 ICC International Building Code.

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- g) ICC 863 ICC International Plumbing Code.
- h) ICC 865 ICC International Mechanical Code.
- i) ICC 871 ICC International Fuel Gas Code.
- j) Army Regulation (AR) 200-1, Environmental Protection and Enhancement, February 1997.
- k) Army Regulation (AR) 200-2.1) Department of Defense, Directive 4120-14, Environmental Pollution Prevention Control and Abatement, August 1977.

1) (AM#2) NFPA 72 National Fire Alarm Code.

m) (AM#2) NFPA 13 Sprinkler Systems.

10. GENERAL CONSTRUCTION REQUIREMENTS

10.1 Government-Furnished Government-Installed Equipment (GFGI)

There is no GFGI in this Contract.

10.2 Government-Furnished Contractor Installed Equipment (GFCI)

There is no GFCI in this contract.

11. SITE CONDITIONS AND REQUIREMENTS

Prior to the commencement of construction, the Contractor and Contracting Officer shall inspect and record the existing conditions of the haul routes. The Contractor shall repair damaged haul routes to pre-construction conditions at the completion of construction and at no additional costs to the Government.

11.1 Project Limits

The Contractor shall confine all work to within the project limits identified on the drawings, unless directed otherwise or approved by the Contracting Officer. Locations of project sites and scope of work for each site are shown on the drawings.

11.2 National Environmental Policy Act (NEPA)

In compliance with the NEPA of 1969, as amended, the Environmental Assessment (EA) and Finding of No Significant Impact (FNSI) for the Transformation to Modular Brigades and Constructing Support Facilities at Fort Hood, Texas is available at the following link:

<http://www.dpw.hood.army.mil/HTML/PPD/Pnotice.htm>

(AM #0002) The Contractor shall verify the requirement of Clean Water Act Section 404 permit for expansion of existing sites and construction of new sites. If a Section 404 permit is required, it shall be obtained from the Regulatory Branch (PER-R), U.S. Army Corps of Engineers. Reference Fort Hood Environmental Compliance Actions Checklist attached to SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD.

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11.2.1 Environmental Protection Plan (EPP)

The Contractor shall prepare an EPP to discuss environmental concerns for both construction and operation of the finished facilities. The Contractor shall submit the EPP at the initial design submittals after contract award. The EPP shall be prepared in accordance with requirements stated in SECTION 01355 **(AM #0002) ENVIRONMENTAL PROTECTION and the Fort Hood Environmental Compliance Action Checklist and Environmental Standard Operating Procedures (IMMU SOP) attached to SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD.**

11.2.1.1 Pre-Treatment and Spill Prevention, Control, and Countermeasures (SPCC)

The Contractor shall determine if operation of the finished facilities require pre-treatment system or containment structures. The finished facilities may require pre-treatment of the industrial **(AM #0002) wastewater discharge (i.e. oil water separator at a vehicle maintenance shop), or provide a design that has zero industrial wastewater discharges as a design preference. Secondary waste discharge (i.e. oil water separator at a vehicle maintenance shop) and a secondary** containment with 110 percent capacity for regulated material storage **(Am #0002) may be required for** in compliance with the SPCC per 40 CFR Part 112.

11.2.1.2 Asbestos-Free Construction Material

The Contractor shall provide certification from manufacture to verify construction materials (i.e. drywall, ceiling tile, floor tile, mastic, insulation materials, sealant, gasket, etc.) do not contain asbestos fibers.

11.2.1.3 Low-Emitting and Non-hazardous Construction Materials

Sealants, glues, mastics, PVC glues shall have a certificate stating that the materials meets the Item 5.C4 Low-Emitting Materials of the Sustainable Project Rating Tool (SPiRiT) requirements, U.S. Army Corp of Engineers. The paint system shall meet requirements stated in guide specification UFGS 09900 PAINTS AND COATINGS for limits on lead. The paint system shall not contain mercury, cadmium, mildewcide and insecticide. Preferential consideration shall be provided for products that meet the SCS-EPP-SP01-01 per guide specification UFGS 09900, paragraph 1.2 SUBMITTAL. Submittal of SSPC QP 1 Certification and MSDS is required. In accordance with the Consumer Product Safety Commission's safety standards, lead content is not to exceed 0.06 percent (600 ppm) by (dry) weight of the material's non-volatile content. Submit MSDS to verify light ballast or transformer do not contain PCB, TCB or DEHP (See SECTION 13284 for definition). Submit MSDS to verify no ozone depleting chemicals in the refrigerants. **(AM #0002) Provide copies of MSDS to Ms. Timi Dutchuk, DPW, Environmental Division's Hazardous Materials Program Manager, telephone 254/287-9718 to ensure that materials brought on post contain only authorized constituents.**

11.3 Regulated Material Management

The Contractor shall manage regulated materials in accordance with SECTION 13280 ASBESTOS ABATEMENT, SECTION 13284 REMOVAL, RECYCLING, AND DISPOSAL OF REGULATED MATERIALS **(AM # 0002), SECTION 13282 METALS ENCOUNTERED IN PAINT DUST DURING CONSTRUCTION, SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD, SECTION 01355 ENVIRONMENTAL PROTECTION.** Reference Regulated Materials Schedule appended herein for estimated quantities based on previous survey

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data and survey conducted in August. ~~(AM #0002) The Contractor shall verify quantities prior to renovation.~~ The Contractor shall submit a 10-day advance notification to Texas Department of Health (TDH) of each renovation structure prior to start work. The Contractor shall coordinate with Fort Hood Environmental and initiate this activity to avoid delay of project schedule. ~~If site demolition is required and asbestos cement (transite) pipes are encountered, the Contractor shall stop work and notify the COR immediately.~~ **(AM #0002) The Contractor shall verify all ACM quantities in each renovated structure, demolition structure and at each demolition site with the COR.** See the **(AM #0002) revised** Appendix REGULATED MATERIALS SCHEDULE.

11.3.1 Safety and Health

The Contractor shall implement safety and health requirements during project execution per SECTION 01525 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS and all submittals in SECTION 01525 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS shall be submitted in the initial design submittals after contract award. Worker exposure assessment shall be performed to protect workers, occupants, and environment during renovation of building structures per SECTION(s) 13280 and 13282 for asbestos abatement and paint disturbance.

11.3.1.1 Air Pollution Control System

The Contractor shall determine if brake maintenance service is needed for the vehicle maintenance shop, i.e. a HEPA vacuum filtration system shall be required. If touch-up paint and welding areas are required for the mission of the facility, those areas shall be forced ventilated.

11.3.1.2 Radiation Safety

The Contractor and the sub-contractor are responsible for obtaining clearance from the Radiation Safety Office on any equipment that contains radioactive materials or produces non-ionizing or ionizing radiation. Such equipment typically includes equipment for Soil Density Testing, Lead-Based Paint Analysis (x-ray fluorescent analyzer), etc.

11.4 Management of Excess Materials and Waste

The Contractor shall manage waste as specified in Section(s) 01355 ENVIRONMENTAL PROTECTION, 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD, 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT, 13280 ASBESTOS ABATEMENT, ~~13282 LEAD IN CONSTRUCTION, and 13284 REMOVAL, RECYCLING AND DISPOSAL OF REGULATED MATERIALS~~ **(AM #0002) 13282 METALS ENCOUNTERED IN PAINT DUST DURING CONSTRUCTION, and 13284 REMOVAL, RECYCLING AND DISPOSAL OF REGULATED MATERIALS, and the Fort Hood Environmental Compliance Actions Checklist and Fort Hood Environmental Standard Operating Procedures (IMMU SOP) attached with SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD.**

11.5 Disposal of Waste Materials

See **(AM #0002) paragraph 11.4 "Management of Excess Materials and Waste" above** ~~Section 01355 ENVIRONMENTAL PROTECTION.~~

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11.6 Demolition and Removals

The Contractor shall be responsible for furnishing an independent topographic survey of the project sites, all line and grade surveys, and as-built surveys of the construction areas. The Contractor shall survey and stake out the project boundaries before starting work. The drawings provided in the RFP indicate existing conditions and locations of existing utilities. The information shown on the base utility maps is the most recent data. The Contractor shall field verify exact locations of all utility lines prior to performing any excavation operations. The Contractor may utilize the utilities during construction operations and may incorporate the utilities as part of the final project. If existing utilities are determined to be inadequate for construction operations or for incorporation into the final facility, they will be upgraded as part of the construction project. However, if the Contractor elects not to use the existing utilities, they will remain in place. The Contractor shall protect existing lines to remain from damage during excavation and compaction operations. Existing utilities that interfere with this project will be relocated. Underground utilities will be disconnected as specified in paragraph INSTALLATION REQUIREMENTS FOR EXISTING UTILITY DISCONNECTIONS. Ten working days notification to the State of Texas Department of Health for demolition or specific asbestos removal operations may be required.

11.7 Survey

Demolition will include clearing and grubbing, where required, scarifying of existing pavements, where indicated and site utilities, where needed. See specifications 02220 DEMOLITION and 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD ~~for additional demolition requirements. Cleared and grubbed material will be disposed of at the Fort Hood landfill.~~ **(AM #0002) For management of cleared and grubbed material, also reference Fort Hood Environmental Standard Operating Procedures (IMMU SOP).** All demolition debris shall be removed to the Fort Hood Municipal Solid Waste Landfill located at the intersection of Turkey Run and Clark Roads. Quantity shall be determined by Contractor at pre-bid site visit. All debris resulting from clearing and grubbing operations shall be taken to the on-post landfill unless prior approval has been granted by the DPW to waste material in a soil eroded area near the construction site(s). All waste delivered to the landfill will be inspected by the landfill operating Contractor for materials that are not authorized in the landfill. Trucks that contain unauthorized waste will be diverted for removal of the unauthorized material before being allowed to proceed to the working facility to deposit their load. The Contractor shall obtain permission from Fort Hood's Directorate of Public Works (DPW) to use the Post's landfill. Submit documentation granting permission and a completed landfill permit to the Contracting Officer prior to start of construction. Any concrete or asphalt rubble removed as a result of demolition or site improvements shall be transported and stockpiled ~~at the DPW yard located near the intersection of West Range Road and South Range Road or as directed within a 20 mile radius of the project sites. Refer to Section 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD for additional guidance and information.~~ **(AM #0002) per SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD, Fort Hood Environmental Standard Operating Procedures (IMMU SOP) and Environmental Compliance Actions Checklist. The stockpile location is within a 20-mile radius of the project sites.**

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11.8 (AM #0002) Remediation of pipe insulation with mold contamination

The insulation on the chilled water pipes in basements where there is signs of mold contamination shall be removed and replaced. The Contractor shall use a glove bag method to remove the insulation. Removal shall be at least 2 inches beyond any visible contamination. Once removed the gloved bagged material can be disposed of with regular construction debris.

12. (AM #0002) STORM WATER POLLUTION PREVENTION PLAN ~~—SITE DESIGN AND CONSTRUCTION~~

(AM #0002) The Contractor shall prepare and submit Storm water Pollution Prevention Plan in accordance with all requirements of TPDES General Permit No. TXR 150000. The Contractor shall be responsible for preparing, signing, and submitting the Notice of Intent and Notice of Termination documents to the State of Texas, and to the DPW Environmental Division. ~~The Contractor shall prepare and submit an erosion control plan and obtain the erosion control permit. The Contractor shall be responsible for preparing, signing, and submitting the Notice of Intent and Notice of Termination documents to the State of Texas.~~

12.1 Storm Water Pollution Prevention

12.1.1 General

A Storm Water Pollution Prevention Plan (SWPPP) shall be submitted in the initial design submittals after contract award. The SWPPP shall be in compliance with the Texas Pollutant Discharge Elimination System (TPDES) **(AM 0002) General Permit** TXR No. 150000. Prepare SWPPP as specified in SECTION 01421 BASIC STORM WATER POLLUTION PREVENTION PLAN. One SWPPP shall cover all sites that require SWPPP (reference TXR 150000 for requirement) and provide separate description for each site that needs a SWPPP. To minimize the review and Contractor resubmittal process, the Contractor shall comply with all requirements stated in PART(s) 11 and 12 of SECTION 01421 **(AM #0002) and SWPPP should also clearly state who is the operator with operational control over plans and specifications and who is the operator with day-to-day operational control. The SWPPP should also identify the parties responsible for implementation of the best management practices or the erosion and sediment controls described in the plan.** The approved plan and items discussed in PART(s) 11 & 12 shall be on-site at all times for inspection by the Texas Commission on Environmental Quality (TCEQ) and installation Environmental office. All activities in SECTION 01421 BASIC STORM WATER POLLUTION PREVENTION PLAN and the approved Contractor SWPPP shall be implemented. The Contractor shall control erosion and sedimentation during construction at all sites, **(AM #0002)** ~~irregardless of the whether the site will require a SWPPP~~ (reference SECTION 01355 ENVIRONMENTAL PROTECTION. Sedimentation of adjacent sites or downstream ditches will not be permitted.

12.1.2 Notice Of Intent (NOI) and Notice Of Termination (NOT) Documents

The Contractor shall have knowledge of the large and small construction activity prior to submittal of NOI and NOT (reference TXR 150000 for definition and requirement for each site). The Contractor and Government shall separately submit a NOI to the Texas Commission on Environmental Quality (TCEQ). There is a 48-hour waiting period prior to site disturbance. The Contractor shall have an approved SWPPP prior to submit the NOI. The

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Contractor shall comply with PART 11 of SECTION 01421 prior to disturb any site. (AM #0002) TCEQ may require a separate NOI and NOT for each site.

12.1.3 Erosion and Sediment Control

(AM #0002) The Contractor shall be responsible to design erosion and sediment control features, such as control structures described in SECTION 01421 and if attainable, a detention pond to retain sediment on site and to minimize erosion downstream of the site. Erosion controls are preferred to sediment controls because they minimize or prevent the movement of sediment, reducing maintenance requirements and the likelihood that excessive pollutants in the construction site runoff. If it is necessary to use a temporary containment structure, it can become a permanent storm water management feature, depending on site-specific storm runoff issues at the finished site. Per TXR 15000, temporary sediment basin are required when feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time. The basin shall provide storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed acre drained. The storm runoff calculation shall be in accordance with paragraph SITE DESIGN AND CONSTRUCTION.

~~The Contractor shall be responsible to design erosion and sediment control features, i.e. detention pond to retain the increase runoff and sediment from the site and to minimize erosion downstream of the site. The temporary containment structure shall receive the final grade and become the permanent storm water management feature for the storm runoff at the finished site. Per TPDES TXR No.15000, the temporary (or permanent) sediment basin are required when feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time, the basin provides storage for a calculated volume of runoff from a 2 year, 24 hour storm from each disturbed acre drained. The storm runoff calculation shall be in accordance with the applicable Storm drainage USACE Technical Manual.~~

13. SITE DESIGN AND CONSTRUCTION

13.1 References

The site design for the support facilities shall comply with the requirements of the applicable parts of the following references:

CESWD Architectural and Engineering Instruction Manual (CESWD-AEIM)

Uniform Federal Accessibility Standards, Federal Register (UFAS)

Americans with Disabilities Act Guidelines (ADA)

TM 5-803-5, Installation Design

TM 5-803-14, Site Planning and Design

TM 5-813-5, Water Supply, Water Distribution Systems

TM 5-814-1, Sanitary and Industrial Wastewater Collection- Gravity Sewers and Appurtenances

TM 5-814-2, Sanitary and Industrial Wastewater Collection- Pumping Stations and Force Mains

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TM 5-820-4, Drainage for Areas Other Than Airfields

TM 5-822-2, General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas

TM 5-822-5, Pavement Design for Roads, Streets, Walks, and Open Storage Areas

TM 5-848-1, Gas Distribution

DG 1110-3-204, Design Guide for Army and Air Force Airfields, Pavements, Railroads, Storm Drainage, and Earthwork

(AM#2) ~~MIL-HDBK 1008A, Fire Protection for Facilities~~

(AM#2) UFC 3-600-1, Fire Protection Engineering for Facilities

(AM#2) UFC 3-420-01FA, Plumbing

MIL-HDBK-1190, Facility Planning and Design Guide

HQUSACE Architectural and Engineering Instructions- Design Criteria
(USACE AEI)

UFC 4-010-01, October 2003, DOD Minimum Antiterrorism Standards for Buildings

(AM #0002) UFC 3-260-01, Airfield and Heliport Planning and Design

Fort Hood Installation Design Guide and the Technical Supplement

Site design shall be in accordance with the Fort Hood Installation Design Guide and Technical Supplement, as well as the references listed above. The construction limits shown on the drawings are approximate. The Contractor shall coordinate exact limits with the Contracting Officer.

13.2 Site Specifications

Army Corps of Engineers guide specifications shall be used by the designer for design and construction. The following site related guide specifications shall be edited, as required for the design and construction of the support facilities required for this project:

02220	DEMOLITION
02230	CLEARING AND GRUBBING
02300	EARTHWORK
02315	EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS
02316	EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS
02510	WATER DISTRIBUTION SYSTEM
02531	SANITARY SEWERS
02556	GAS DISTRIBUTION SYSTEM
02570	VALVE PITS AND PIPING AND EQUIPMENT IN VALVE PITS
02630	STORM-DRAINAGE SYSTEM
02713A	BITUMINOUS BASE COURSE
02722	AGGREGATE AND/OR GRADED-CRUSHED AGGREGATE BASE COURSE
02741A	HOT-MIX ASPHALT (HMA) FOR ROADS
02748	BITUMINOUS TACK AND PRIME COATS
02770	CONCRETE SIDEWALKS AND CURBS AND GUTTERS

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02821A FENCING

13.3 Erosion Control Plan

(AM #0002) A Storm Water Pollution Prevention Plan is required. See paragraphs "Storm Water Pollution Prevention" and "Erosion and Sediment Control."

~~A Storm water Pollution Prevention Plan is required. Silt fences, hay bale barriers and other storm water controls are required to prevent the movement of silt and other construction debris from the construction sites. The Contractor shall be responsible for preparing and submitting an erosion control plan. The Contractor shall be responsible for preparing, signing and submitting Notice of Intent and Notice of Termination documents to the State of Texas.~~

13.4 Site Constraints

13.4.1 The new project storm water system shall not impact the surrounding sites. Construction shall not impact the existing drainage system adjacent to the site.

13.4.2 Force Protection Setback Requirements

Buildings and parking areas shall be located on the site in accordance with the Unified Facilities Criteria, DOD Minimum Antiterrorism Standards for Buildings, UFC-4-010-01 (Oct 2003) **(AM #0002) per Appendices B GEOTECHNICAL REPORT and C FORT HOOD INSTALLATION DESIGN GUIDE** ~~for Expeditionary and Temporary Structures~~ and Security of Unclassified Army Property (Sensitive and Nonsensitive) AR 190-51. All mechanical and electrical equipment shall be located outside the unobstructed space.

13.5 Traffic Control

If new construction affects the flow of traffic, a Traffic Safety Plan using recommendations of Section VI of the Uniform Traffic Control Devices Manual (UTCDM) shall be followed. In addition to the UTCDM the Contractor must maintain 50% of traffic capacity at all times.

13.6 Contractor's Storage and Staging Area

The Contractor's Storage and Staging Area will be located **(AM #0002) at each site. The specific location of staging and storage areas will be coordinated with the Contracting Officer** ~~east of the parking area of Building 4622 (Army Corps of Engineers Central Texas Area Office) located on Engineer Drive, unless directed otherwise by the Contracting Officer.~~ The Contractor shall construct a temporary 6-foot high chain link fence around trailers and materials. Visibility through the fence shall be obstructed by cloth fabric attached to the fence fabric or by a method approved by the Contracting Officer. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the military boundaries. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors,

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wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

13.7 Construction Haul Route

The construction entrance will be off of Clarke Road north to Tank Destroyer Road. The specific haul routes for each of the site locations will be determined by the Contracting Officer at the Pre-construction conference.

14. DESIGN REQUIREMENTS FOR SITE CONSTRUCTION, UPGRADES AND REPAIRS

14.1 Pavement Upgrades and Repairs

Flexible pavement design and construction details shall be in accordance with TM 5-822-5 and CESWD-AEIM. Refer to the Appendix Government Geotechnical Report (Preliminary), for pavement sections and pavement material requirements.

14.2 Curb and Gutters

Provide curb and gutters at hardstands, where needed to control erosion from drainage. Curb and gutter shall be a 6-inch concrete curb and gutter 2 feet wide. All gradients shall provide positive drainage (no ponding). Curb cuts and concrete flumes shall be provided as necessary for pavement drainage. Riprap shall be provided from the edge of the concrete to drainage ditch bottom as required for erosion control purposes.

14.3 Fencing

As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work sites. The Contractor must completely enclose construction areas and buildings to be demolished with chain link security fencing. The fence shall be 6 feet with three strands of barbed wire for a total of 7 feet. The safety fencing shall be 9 gage chain link fencing, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved locations. Do not include a top pipe rail. Chain link fence fabric shall be tied on the secure side of the fence using wire ties not clips. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work sites. ~~(AM#2) See paragraph 5.5 for additional fencing requirements.~~

TEMPORARY HAZARD SAFETY FENCING: The Contractor shall furnish and erect safety fencing at temporary hazards and work site areas considered to be hazardous to the public. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved locations. The safety fencing shall be maintained by the Contractor during the life of the hazard and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

14.4 Handicap Access

Ramps and sidewalks shall be provided for handicapped (HC) access to the to the applicable facilities. The number of designated parking spaces for the

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physically disabled shall be two spaces per facility and shall be designed in accordance with the Uniform Federal Accessibility Standards for ADA facilities. ~~Concrete sidewalks shall consist of 4" reinforced concrete on top of a 4" sand cushion. The sand cushion shall be compacted by two passes of a vibratory plate compactor. Minimum walk width shall be 6 feet. Sidewalks shall be reinforced with 6" X 6" W3 X W3 welded wire mesh.~~

(AM#2) 14.5 Side Walks

Concrete sidewalks shall consist of 4" reinforced concrete on top of a 4" sand cushion. The sand cushion shall be compacted by two passes of a vibratory plate compactor. Minimum walk width shall be 6 feet. Sidewalks shall be reinforced with 6" X 6"- W3 X W3 welded wire mesh.

Contraction joints shall be spaced at the width of the sidewalk on centers and expansion joints shall be placed at 40 feet on center and at the intersection of walks and curbs. Provide centerline contraction joints in walks wider than 8 feet, spaced at 6 feet maximum.

(AM #0002) 14.6 Bollards

Modular facilities shall be protected by bollards where collision hazards may exist. Provide steel bollards at maintenance bay doors, at fire hydrants, at POL storage tanks, and at any other locations where frequent vehicle access/egress increases the risk of damage by vehicle impact.

(AM #0002) 14.7 Building Orientation

Laundry and day room facilities should be centrally located to the barracks facilities. Arms rooms shall be sited in the vicinity of the Company Operations Facilities. Dumpsters shall be located behind facilities where possible. One dumpster pad shall be provided per 100 soldiers in the barracks complexes. Provide one dumpster at each of the maintenance shops, classroom, administration and unit storage facilities.

15. BORROW

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from borrow areas **(AM #0002) designated by the Installation. Borrow material shall initially be obtained from the IMMU per SECTION 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD. If sufficient material is not available from IMMU, or other on-post locations, obtain material from** located off Government Controlled property and within 10 miles of the project site(s) and at the responsibility of the Contractor. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation. Borrow pits shall be neatly trimmed and drained after the excavation is completed. Borrow materials shall be free of any contaminants.

16. UTILITY LAYOUT AND DESIGN

Coordination of all site work on the project, including utility work, is the responsibility of the Contractor. It is the Contractor's responsibility to confirm the specific locations of the existing utilities and to design and construct new utility services for the new buildings. All utilities necessary

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to service the new facilities are readily available within or along the perimeter of the project sites. Flow data for gas and water utilities in the area can be obtained from the Installation's DPW office and Fire Department. Electronic copies of the base utility maps for the project area will be furnished with the advertisement package. The Contractor shall provide a minimum of 1 week notice to the Installation's DPW office of any planned utility outages. The new facilities will be all electric except at the unit storage facility, where gas will be provided. See paragraph [SITE ELECTRICAL DESIGN](#) for site electrical requirements.

All utilities, including electrical service, telephone and cable TV, shall be installed underground. New underground utility lines, including appurtenant structures such as valve boxes, manholes, vaults, etc. shall not be located under pavements, road shoulders or drainage ditches to the maximum extent practicable. Unless otherwise approved by the Contracting Officer, placing utilities and culverts under existing roads shall be by jack and bore construction. Excavation of trenches, installation of lines and backfilling for utilities shall be in accordance with earthwork and grading requirements and conform to standard military construction practices. The bedding surface of the new pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. All gravity flow lines of more than one manhole shall be profiled. Sections shall be provided for all culverts.

The Contractor shall obtain digging permits directly from the Fort Hood Post DPW before any drilling, digging or excavation is undertaken. Provide a completed form FHT 420-X10, Coordination for Land Excavation, to the DPW, Building 4612, Fort Hood, Texas for each permit required. The Contractor shall allow 24 hours for Government review of digging permit request. The Contractor shall apply immediately after contract award for the digging permit. Digging and/or excavation shall not start until approval of digging permit has been received. Permits will identify all underground utilities within 5 feet of the designated area. The Contractor is responsible for all repairs, costs and damages due to excavation without a permit or for damaging an identified utility. Unidentified utilities shall be repaired by the Contractor at Government expense.

16.1 Backflow prevention valves, post indicator valves, transformers, electric switches, telephone/cable boxes, manholes, irrigation pumps and controllers, etc. shall be located in locations not immediately apparent to the facility users or personnel passing by the site.

16.2 Marking Of Utility Lines

Utility lines shall be marked with plastic marking tape in accordance with the applicable paragraphs of specification sections 02510, 02531 and 02556.

16.2.1 Tracer Wire

In addition to the plastic marking tape, tracer wire shall also be provided for all new underground utilities, except sanitary sewer, in accordance with the applicable specification sections. Tracer wire shall be subject to approval by the Contracting Officer and shall be tested and proved continuous prior to final inspection.

16.3 Installation Requirements for Existing Utility Disconnections

16.3.1 References:

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- a. The National Standard Plumbing Code
- b. NSPC Standard
- c. **(AM #0002) TCEQ, 30 TAC 290 (Water); 30 TAC 317 (Sewer)** ~~TNRCC, 30 TAC 290 (Water)~~
- d. TXDOT Standards for Natural Gas

16.3.2 Water Line Disconnections

Existing water service lines, associated with older buildings to be demolished and other construction where required, shall be physically separated from, and capped or plugged at the water supply main at the first threaded connection closest to the main. Where the supply from the main feeds more than one building, and those remaining buildings will have continued water service, the Contractor shall physically separate, and cap or plug the water supply for the demolished building at the tee branch. Where demolished buildings have separate fire lines (typically 4"-8" diameters) for fire protection, the Contractor shall physically separate the fire line from the source main, between the operating valve and the main, and cap or plug the service lead as close as possible to the main. In all cases, if the materials of previous construction included leaded joint tees as the point of connection from the water main to the lines to be abandoned, the Contractor shall physically remove the main line tee and replace the portion of the main which was affected. **AM #0002 The water line "stub" shall be no longer than three feet from the active water main wherever possible and practicable. Exceptions to this requirement shall obtain approval from the Installation DPW Maintenance Division.** All valves and valve boxes associated with the utility lines to be abandoned shall be removed from the site and shall not be buried in place, unless there are other buildings that are affected by the same service line tap.

16.3.2.1 Replacement of Spoil Materials At Utility Excavations

Existing lines that are to remain in service and which are exposed during excavation shall have sand tamped in place around and under those utilities, and be brought to a height of at least 1 foot above the affected line. Changes to remaining utilities will be identified accurately by the Contractor and provided to the Contracting Officer for updates to base utility maps. **(AM #0002)** ~~Contractor shall sanitize/disinfect new materials that have to be installed to meet the above requirements. The Contractor shall provide Customer Service Inspection and include the required forms.~~

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(AM #0002) 16.3.2.2 Potable Water System Disinfection and Inspection
Procedures

The Contractor shall sanitize/disinfect in accordance with TCEQ standards for the new or repaired water distribution piping installed to meet the above requirements, or existing water distribution piping where the integrity of the system was compromised. Records of all disinfection procedures and bacteriological sampling results shall be maintained by the Contractor and copies of these documents shall be provided to the COR, and the Installation DPW Environmental Division no later than one week after the work is performed or sample results are obtained. New water mains shall be thoroughly disinfected in accordance with AWWA Standard C651 and then flushed and sampled before being placed in service. The Contractor shall provide a Customer Service Inspection where needed and submit the original Customer Service Inspection form to the DPW Environmental Division.

16.3.3 Sanitary Sewer Line Disconnections

Existing lateral sewer lines from the demolished buildings (typically 3"-8" diameters) shall be physically separated from the sewer collection system at the closest point to the receiving manhole, or branch wye if the lateral receives effluent from additional buildings that are to remain in service. The Contractor shall permanently cap or install a concrete plug or other Contracting Officer approved device permanently affixed to the remaining portion of the active sewer line that will prevent groundwater influence. All cleanouts and similar above ground fittings associated with sewer lines to be abandoned shall be physically separated from the lateral line at the fitting (wye) below grade and removed from the site.

16.3.4 Natural Gas Line Disconnections

Natural gas service lines shall be capped as near as possible to the source of supply and are typically either Polyethylene (PE) or steel. The Contractor shall heat fuse a PE cap in accordance with pipe manufacturer's recommendations or install a threaded plug or cap of approved material for steel lines as close to the tee as possible. The building riser shall be physically separated below grade at the depth of the service line and removed from the site(s). The abandoned service line shall be filled with water and each end shall be permanently capped or plugged, if the abandoned service line is not physically removed in its entirety from the original service line ditch. All associated service valves and valve boxes shall be physically removed from the site.

17. PERMITS

The Contractor shall determine permit requirements as part of the design process and shall secure all permits necessary for this construction. Also see paragraphs DEMOLITION AND REMOVALS and UTILITY LAYOUT AND DESIGN and Section 01368 SPECIAL PROJECT PROCEDURES FOR FORT HOOD, for additional permitting information.

18. STORM DRAINAGE

18.1 Site Storm Drainage System

The site storm drainage system, if required shall be designed for a 10-year return storm frequency. No ponding shall occur for the 10-year event. Storm

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drainage system design shall be checked for a 100-year return event to insure no flooding or adverse impacts occur downstream. Storm drainage design shall be in accordance with TM-5-820-4. The storm drain collection system may consist of grassed ditches, gravel ditches, retention/detention ponds, grassed swales, concrete inlet drop or curb inlets, concrete headwall and pipe systems. Minimum capacity of the storm water system shall be for pre-development storm water runoff equal to post-development storm water runoff. The proposed system shall tie to the existing grassed ditches or pipe systems. The minimum pipe size for an open pipe system shall be 18 inches and 15 inches for a closed system.

18.2 Storm Drainage Pipe

18.2.1 Culverts shall be reinforced concrete pipe, Type III or IV and a minimum of 24 inches in diameter. Pipe joints shall be water tight with gaskets.

18.2.2 Fully coated, fully paved corrugated metal pipe is allowed within the site boundaries of the temporary facilities, except in the vehicle maintenance complex site.

18.2.3 Reinforced concrete pipe, type III shall be used in the vehicle maintenance complex site.

19. WATER DISTRIBUTION

19.1 The Contractor is required to design and construct the new water distribution utility service to the new facilities, where applicable. Water service shall be designed and constructed in accordance with TM 5-813-5 (AM #0002) and the 30 TAC 290, whichever is the more stringent. Minimum earth cover for the new utility lines will not be less than 27 inches, except for fire water supply lines where the minimum cover shall be 30 inches.

19.2 The Government anticipates that the Contractor will connect the new water laterals to the existing water distribution system and that sufficient pressure and quantity will be available for domestic and fire protection use. The design of the water distribution mains and service lines shall provide adequate quantity at sufficient pressure for domestic use and fire protection use. The Contractor shall determine minimum pressures in accordance with applicable plumbing and fire protection criteria.

19.3 The mains shall be designed and installed in accordance with NFPA 24 and applicable AWWA standards. Use C-900 pipe for water lines to avoid requirement for cathodic protection. Water mains shall follow existing streets or utility corridors. The design shall limit installation beneath pavements, where feasible.

19.4 Design of the service lines shall be in accordance with the National Plumbing Code and applicable AWWA standards. A curb stop or valve shall be installed near the point of connection to the main. Water service lines shall be equipped with suitable meters. Metering of fire service lines is not required. Provide isolation valves at underground tees or crosses. Valve boxes shall be at least 6 inches or larger.

19.5 Water Supply for Fire Protection

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New buildings will be sprinklered, where applicable, in accordance with the applicable codes, standards and regulations. Refer to paragraph **FIRE PROTECTION** for additional fire protection requirements.

19.5.1 Interior and outside fire protection shall be designed in accordance with UFC 3-600-01, Fire Protection Engineering for Facilities.

19.5.2 The Contractor shall provide the required water flow and pressure for the interior and outside (hose stream) demand.

19.5.3 The fire sprinkler supply line shall include a post indicator valve (PIV) with a tamper switch wired to the building fire alarm panel and a double check valve assembly backflow prevention device equipped with a flow detection meter. The backflow prevention device is located in the building. If the PIV is located in a concrete paved area, show an electrical conduit routed under the pavement.

19.5.4 Fire hydrants shall be located in accordance with UFC 3-600-01 and shall have a 6" shutoff valve for each hydrant. Fire hydrants shall have a 6" bell connection, two 2 ½" hose connections and one 4 ½" pumper connection. All hydrants shall be installed with a 6" gate valve for isolation. Provide at least two bollards around each hydrant subject to damage from vehicular traffic. Bollards will be located on the traffic side of the hydrant and spaced 2'-3' apart.

20. SANITARY SEWER

The Contractor is required to design and construct the new sewer service lines to support the new facilities, where applicable. The Contractor shall construct the new utilities in accordance with the requirements of **AM #0002 30 TAC 317 and** TM 5-814-1. The wastewater design should attempt to service the areas by gravity only, where feasible. The use of lift stations should be kept to a minimum. If lift stations are required, provide a packaged unit assembled of coated metals that do not easily corrode **AM #0002, they shall be in compliance with all applicable provisions of 30 TAC 317.2.** Provide an audible and visible alarm in case of a malfunction. Ensure that the location of the lift station is accessible for servicing. Minimum sewer main shall be 8 inches in diameter with a minimum of 6 inches for building sewer connections. Use SDR-26 PVC pipe for sewer piping to avoid the cathodic protection requirement. All sewer lines beneath buildings shall be SDR-26 PVC in lieu of cast iron. A tracer wire is not required for sewer pipe systems. Provide two way cleanouts at the building connection. See paragraph PLUMBING DESIGN REQUIREMENTS for additional information.

21. GAS DISTRIBUTION

The Contractor is required to design and construct the new gas distribution and service lines to support the new facilities, where applicable. The Contractor shall construct these utilities in accordance with the requirements of TM 5-848-1. DPW will determine whether or not the distribution pressure gas service is sufficient to serve the proposed construction. DPW will also indicate the location for the service tap. Gas distribution lines will be metered and regulated in accordance with applicable codes and regulations. Provide anodeless risers to regulators. Lines to regulators shall not be less than 1 inch. Use PE piping in lieu of ferrous metal underground piping. Provide poly valves in lieu of metal for underground valves. Limit gas valves to 8 inches. Ensure valve boxes are at least 6 inches or larger. All buildings shall be metered. The meter shall have a valved bypass. Provide ¾"

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plugged taps on each side of the pressure regulator. See paragraph HEATING, VENTILATING, AND AIR CONDITIONING REQUIREMENTS for additional information.

22. SITE GRADING

22.1 **AM #0002** The finish floor elevations of the new facilities shall be a minimum of 1 foot above finished grade. Arms vault finished floor shall be a minimum of 6 inches above finished grades. Finished floors for the vehicle maintenance buildings shall be 8" above finished grade and 1" above vehicle bay door entrance pavement. ~~The finish floor elevations of the Unit Storage Facility and the Battalion Classroom (Option 1) shall be a minimum of 1 foot above finished grade.~~ Finished grades shall provide positive drainage of 5% away from the building for a minimum distance of 10 feet. Minimum finish grades do not apply to drainage swales and ditches. Swales and ditches shall have a desired minimum of 0.5% at the flow line, with an absolute minimum slope of 0.3%.

23. FOUNDATION AND GEOTECHNICAL DESIGN

Refer to the Government Geotechnical Report (Preliminary), included as Appendix A, for the minimum geotechnical requirements for design and construction of project foundation and pavement features.

24. LANDSCAPE DESIGN

AM #0002 Landscaping is not required. Turfing or seeding shall be required for disturbed sites where paving is not provided. See Section 01421 BASIC STORM WATER POLLUTION PREVENTION PLAN. ~~Turfing and landscaping is not required.~~

25. IRRIGATION SYSTEM

Irrigation system is not required.

26. ARCHITECTURAL DESIGN REQUIREMENTS

26.1 GENERAL

(AM #0002)

a. All facilities shall include stairs or ramps and entry landings at all entrances to meet applicable codes.

b. All facilities with crawl space shall have skirting. All janitor closets shall have mop sink, mop rack, 6 linear feet of storage shelving and floor space for storage of janitorial equipment.

c. See electrical requirements for communications room/SIPRNET communication room requirements.

26.2 Functional Layout

Functional requirements are described in the Facility Functional Requirements documents. Arrange spaces in an efficient manner with simple circulation.

26.3 Room Sizes

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Room sizes shown in Facility Functional Requirements documents, **(AM #0002) including Appendix K RELOCATABLE FACILITIES FUNCTIONAL REQUIREMENTS and the drawings,** are minimum clear space. Minor adjustments to room sizes may be acceptable if furnishing and functioning of the rooms are unaffected, **(AM #0002) except barracks bedroom and closet shall not be less than the minimum stated area.** Ceilings at occupied areas shall be minimum 8 feet-0 inches.

26.4 Handicapped Accessibility

Facilities shall be handicapped accessible **(AM #0002) when required in Appendix K RELOCATABLE FACILITIES FUNCTIONAL REQUIREMENTS** ~~unless otherwise exempted.~~

26.5 Finishes

Exterior and interior finishes shall be the manufacturer's standard commercial-grade products and standard colors except where noted otherwise or specified in the UFGS guide specifications. Facilities of the same type grouped on the same site shall have the same exterior finishes and colors. Preferred exterior wall color is beige. Floor finish in bathrooms, restrooms, janitor closets, shower/locker rooms, and all other wet areas shall be seamless resilient flooring **(AM #0002)** ~~or ceramic tile.~~ Suspended acoustic tile ceiling is not permitted for **(AM #0002) wet areas,** barracks bedrooms, and closets.

26.6 Doors And Windows

All exterior glazing shall be 1/4-inch laminated glass consisting of two 1/8-inch thick glass panes bonded together with a minimum 0.030-inch thick PVB interlayer. For insulating glass units, the inner pane shall be laminated glass as described above. Glazed door and window frames shall resist an equivalent static design load of 1 lb per square inch applied to surface of glazing and frame with frame deformation not exceeding 1/60 of the unsupported member lengths. Steel members may be designed using ultimate yield stresses and aluminum members may be designed based on a 0.2 percent offset yield strength. Glazing shall have a minimum frame bite of 1 inch. Door/window frame connections to building, hardware and associated connections and glazing stop connections shall resist equivalent static design load of 10.8 psi for glazing panels with vision area less than or equal to 10.8 square feet and 4.4 psi for glazing panels with vision area greater than 10.8 square feet and less than 32 square feet. Loads shall be applied to the surface of the glazing and the frame. Connections and hardware may be designed based on ultimate strength for steel and 0.2 percent offset yield strength for aluminum. All exterior doors must swing out. Exterior doors shall be insulated hollow metal. Exterior entry doors shall be SDI Level 3. Except at vaults, interior doors shall be solid core. Windows shall be energy efficient with double pane insulating glass units. Each sleeping room shall have an operable window. Operable windows at administrative offices are preferred. All windows shall have mini-blinds. All operable windows shall have insect screens and locks.

26.7 Door Hardware

Doors shall have minimum three Grade 1 hinges per leaf. Locksets at exterior doors, living unit entry doors, and individual sleeping room doors shall be grade 1, with deadlock feature. All exterior outswinging doors shall have non-removable hinge pins. See paragraph CONSTRUCTION ELEMENTS AND PRODUCTS.

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26.8 Arms Vault

Arms vault shall be five-sided UL Class 3 modular vault. Door shall be GSA Class 5 vault door with (AM #0002) day gate ~~daygate~~ and built-in three-position, dial-type changeable combination lock. Slab on grade at arms vault shall be 6 inches thick reinforced with W4 by W4 mesh 6 inches by 6 inches or equivalent bars. See mechanical and electrical for additional requirements.

26.9 Document Vault

Document vault shall be six-sided UL Class M modular vault. Door shall be GSA Class 5 vault door with (AM #0002) day gate ~~daygate~~ and built-in three-position, dial-type changeable combination lock. See mechanical and electrical for additional requirements.

26.10 TA-50 Locker

TA-50 locker shall be heavy-duty ventilated locker with 14 ga steel doors and 16 ga steel sides, tops, bottoms and shelves. Frame shall be welded. Doors and sides shall be perforated in a diamond-shaped pattern for ventilation. Doors shall have padlock hasp. Finish shall be manufacturer's standard baked enamel in manufacturer's standard color. Size of each locker shall be 24 inches by 24 inches by 72 inches high.

26.11 Sound Isolation

Partitions at barracks bedrooms, private offices, conference rooms, and classrooms shall have STC 49 for sound isolation from all adjacent rooms. At barracks, perimeter of sound isolation area at each bedroom (AM #0002) shall ~~may~~ include the occupant's closet.

26.12 Building Numbers

Each new facility shall have a building number sign located on two faces, permanently affixed to building. Location, design, size and colors shall be in accordance with Fort Hood Installation Design Guide. Coordinate with Fort Hood for assigned building numbers for each facility.

26.13 Fire Extinguishers

Provide fire extinguishers as required by Installation requirements or code. Fort Hood's DPW Fire Dept. no longer provides fire extinguishers.

26.14 Rainwater Management

Each new facility shall have gutters, downspouts, and concrete splash blocks. If gutters are not feasible for the type of structure provided, provide some means of diverting rainwater from the roof around all personnel doors is required; provide justification.

27. STRUCTURAL INTERIOR DESIGN (SID)

See Section 01016 DESIGN DOCUMENTS REQUIREMENTS for additional requirements.

27.1 Definition

The Structural Interior Design (SID) shall involve the selection and sampling of all applied building related finishes necessary to complete the building's

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interior and exterior architecture. The SID submittal shall be submitted concurrent with the architectural design submittals.

27.2 Exterior and Interior Finish Design Review

The Contractor shall attend and present all exterior and interior finishes at the design reviews. The purpose of the design reviews is to present and discuss the SID color scheme for the project. Actual exterior and interior materials, finishes, and colors are to be provided for review and comment. At the end of the design review the Government will decide the final SID finishes that will be accepted for incorporation into the facilities.

27.3 In general, the SID shall reflect a transitional, professional image. Wall colors throughout the facility shall be a neutral color that will enhance accent colors in the existing furniture related items. Accent walls will not be approved for private offices. Accent walls will not be approved except for the lobby areas. The cove base and door trim shall be a neutral color and shall be consistent throughout the facility. Interior stain colors and finishes shall be consistent throughout the facility. All finishes shall be Class A. Specific locations where the various materials are required will be indicated during the design after award submittals.

27.4 Signage Requirements

Interior signage is an important item that is to be fully integrated with the architecture and building related finishes. All signage shall be in accordance with the Department of the Army Technical manual, Signage, TM 5-807-10 and installation sign standards (see Fort Hood Installation Design Guide). All signs are to be from one manufacturer and shall match in color and style. All room sign copy shall be Helvetica medium with a ratio of height and width to meet Americans with Disabilities Act (ADA) requirements. Signs shall be provided for all interior doors. Installation shall be wall mounted, on the latch side of the door with the center of the sign installed 5 feet-0 inch above the finish floor and 3 inches from the outside edge of the metal door frame. Where conditions do not allow signs to be mounted directly adjacent to the door, install signs on the wall at the nearest point to the latch side. Signage for general office areas (BB2) shall be a modular plaque format with a minimum of two insert slides. All signs are to have a permanent room number sign. All signs shall be a minimum overall dimension of 9 inches wide and 6 inches high. Under the visual printed room number an integral, tactile, corresponding, Grade 2 Braille indicating the room number. The second two slides are to be window insert slides to accommodate personnel changes or room name changes. Living Unit signs (BB5) shall be modular plaque format with a min. of three insert slides. Insert shall allow the user to insert computer generated copy behind acrylic face insert. BB5 sign types shall be 6 inches wide by 8 inches high. Mechanical rooms and other building system room and service support rooms (BB4) including restrooms (BB7) shall have permanent room signs with copy that has raised room numbers and permanent room names. Copy shall be raised, tactile, letters and Grade 2 Braille indicating the room number and room name. Signs shall be permanently and mechanically attached to the building. Double-sided tape is not acceptable. Signage message shall be coordinated with the Government/user before ordering or installation. Provide Emergency Egress sign plaques (BB8) that indicate "YOU ARE HERE" and the path of egress. These signs shall be fully coordinated with the Installation Fire Marshal at the review submittal design phase and before fabrication and installation. The Fire Marshal shall review the correct placement and quantity of the signs within the building and also review the proposed path of egress that will be graphically illustrated on the

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sign. Suggested placements for the signs shall be determined prior to installation.

28. COMPREHENSIVE INTERIOR DESIGN (CID)

28.1 (AM #0002) ~~The preparation of the Comprehensive Interior Design is part of the Base Bid.~~ The Contractor shall install furniture and other items listed in the Contractor-prepared CID. The furniture shall be coordinated with the prepared and approved Furniture Placement drawings developed in the SID. Installation shall include scheduling shipments from vendors, accepting delivery at the site, unloading, inventorying, securing and installing the items. See Section 01016 DESIGN DOCUMENTS REQUIREMENTS for additional requirements.

28.2 Definition

The CID involves all the furniture-related components necessary to complete the interior environment. The necessary components includes all loose furniture and furnishings.

28.3 CID Philosophy

The CID for each facility shall be coordinated in color, texture, pattern, size, form and function with building footprint and the SID. Furnishings submitted for approval shall reflect the image and style presented in the architecture to further support the corporate image, and with the function and mission of the facility occupants considered. All furniture/furnishings shall be selected under the guidance of the National Defense Authorization Act - FY 2002, S1438, Title VIII, Subtitle B, Sec 811, Para 2410 which states UNICOR is no longer a mandatory source for furniture and a waiver is not required from UNICOR on items before selecting from GSA Schedules. However, UNICOR shall be considered as a vendor to determine if UNICOR offers the "Best available" product in terms of quality, price, and timeliness. If a UNICOR product is not the "best value," then GSA schedules shall be used for selection of furniture/furnishings. All furniture/furnishings shall be selected form GSA Schedules or UNICOR. The GSA web site is: www.gsa.gov. The UNICOR web site is: www.unicor.gov.

28.4 Format

The CID presentation shall be 2-foot by 3-foot matte boards which show pictures of the furniture and shall include actual samples of the finishes, not photographs of the finishes. Presentation boards shall be grouped by areas, i.e. but not to exclude other areas, systems furniture, closed offices, executive offices, barracks rooms.

28.5 CID Coordination and Installation

The Contractor shall develop and fully coordinate the CID package with the SID package. The CID submittals shall run concurrent with the SID submittals. The Contractor is required to purchase the CID package items and is required to schedule with all the CID vendors the delivery and installation of the CID. Phasing the delivery and installation of the CID package items shall be determined by the Contractor. The Contractor will procure the CID items.

28.6 Requirement Analysis

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The Contractor shall determined the CID requirements. CID items and quantities shall be determined by but are not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function (3) room functions (4) rank and grade. See Facility Functional Requirements documents for personnel and equipment requirements.

28.7 CID Furnishing List

Typical CID items to specify are, but not limited to:

(AM #0002) ~~Executive Wood Furniture~~

Support desks

Bookcases

Bulletin Board, Porcelain Marker Boards

(AM #0002) **Seating, including chairs and stools** ~~Chairs-all kinds, including stools~~

Desks-freestanding technical support and Executive Level Quality

Panel supported, systems furniture workstations- prewired (see Elect.)

(AM #0002) **File cabinets** ~~Files-all kinds~~

Lamps-all kinds

(AM #0002) ~~Podium/lecture stands~~

(AM #0002) **Storage cabinets** ~~Storage-all kinds~~

(AM #0002) **Tables** ~~Tables-all kinds~~

(AM #0002) **Waste containers - various sizes** ~~Waste cans-various sizes~~

(AM #0002) ~~Classroom chairs and tables~~

(AM #0002) ~~Conference room furniture~~

(AM #0002) **Appliances**

(AM #0002) **Include for submittal and review all specific/special items as required by the Government/user.** ~~Including all specific/special items as required by the Government/user~~

29. STRUCTURAL DESIGN REQUIREMENTS

29.1 General

The following criteria shall be used for loading, design and installation of all structural systems, including manufacturing, erection, supervision, testing and quality assurance. The completed structural design shall include all elements for foundations, walls, roof framing and diaphragms. It shall also include lateral load stability analyses as well as support for architectural features, mechanical and electrical equipment. Floor loads considered in the design shall include those necessary for the support of safes, vaults, special storage requirements, etc. as required by the user for specific functions in specific buildings. All calculations shall be performed by a registered engineer and checked by an engineer other than the design engineer. The primary code used for structural design shall be the 2000 International Building Code (IBC) and those codes referenced therein.

29.2 Design Loads

Dead loads shall be the actual weights of materials, including all mechanical and electrical items. Live loads and load combinations shall be in accordance with the requirements of the IBC 2000.

29.2.1 Wind load shall be in accordance with the IBC 2000.

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Wind Velocity: 90 mph
Exposure: C
Category: I
Importance Factor: 1.0

29.2.2 Seismic load shall be in accordance with IBC 2000.

Spectral Response

Ss: AM 0002 0.09
S1: AM 0002 0.05

29.3 Drawings

29.3.1 Walls mostly below grade that are supported laterally by diaphragms at or near the top and bottom, shall be designed using loadings based on at rest soil pressures.

29.3.2 Diaphragms shall have continuous chord members on all edges and shall have a direct positive connection for transferring load to all members of the main lateral force resisting system.

29.3.3 References and Design Criteria

- a. Minimum Design Loads for Buildings and Other Structures - ANSI/ASCE 7-2002.
- b. Fort Hood Installation Design Guide
- c. CESWD Architectural and Engineering Design Guide (CESWF-AEIM), including all references
- d. (UFGS) Unified Facilities Guide Specifications. The DESIGNER will be required to provide a fully edited Guide Specification for all applicable structural components. **AM 0002 Specification 13120, Standard Metal Building Systems, included as part of the TVM is not to be used. All specifications are to be the most current available.** All requirements contained in the RFP document must be incorporated into the edited specifications and/or drawings. Generally, the following structural specifications are required for building construction (other Guide Specs may be required depending upon the structural system used):

02466A DRILLED FOUNDATION CAISSONS (PIERS)
03100a STRUCTURAL CONCRETE FORMWORK
03150a EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS
03200a CONCRETE REINFORCEMENT
03300 CAST-IN-PLACE STRUCTURAL CONCRETE (FOR BUILDING CONSTRUCTION)
03370 CONCRETE FLOOR HARDENER
04200 MASONRY
04210 NONBEARING MASONRY VENEER/STEEL STUD WALLS AM 0002
05120 STRUCTURAL STEEL
05210 STEEL JOISTS
05310 STEEL DECKING AM 0002
05400 COLD FORMED METAL FRAMING

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13120 PREENGINEERED METAL BUILDINGS

- e. AM 0002 MBMA-01 Low Rise Building Systems Manual (latest edition).
- f. AM 0002 National Concrete Masonry Association (NCMA), Specifications for the Design and Construction of Load Bearing Concrete Masonry.
- ~~AM 0002 g. Design and Construction of Load Bearing Concrete Masonry.~~
- g. ACI-ASCE 530, Building Code Requirements for Concrete Masonry (2002)
- h. American Institute Of Steel Construction (AISC), Manual of Steel Construction, 9th edition
- i. Manual of Steel Construction, LRFD 3rd edition
- j. Steel Deck Institute (SDI) Diaphragm Design Manual (latest edition)
- k. American Welding Society, Welding Handbook
- l. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders
- m. ACI 315-02, Details and Detailing of Concrete Reinforcement
- n. ACI 318-02, Building Code Requirements for Structural Concrete
- o. SDI Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Decks
- p. (AM #0002) American Plywood Association, "APA Design/Construction Guide"
- q. (AM #0002) "SDI Diaphragm Design Manual latest Edition."
- r. (AM #0002) National Forest Products Association, "National Design Specification for Stress Grade Lumber and its Fastening."
- s. (AM #0002) American Plywood Association, "APA Design/Construction Guide."
- t. (AM #0002) Truss Plate Institute, "Design Specification for Metal Plate Connected Wood Trusses."
- u. (AM #0002) American Institute of Timber Construction (AITC)
- v. (AM #0002) TI 809-07, Design of Cold-Formed Load Bearing Steel Systems and Masonry Veneer/Steel Stud Walls (Nov. 98).

Design Guidance

Design Criteria - International Building Code 2000. To prevent cracking of brick veneer, limit building drift for a brick veneer building to

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h/400. Limit building drift for a metal skinned building to h/180 to prevent damage to interior partitions. Design for a 50-year recurrence interval with the design parameters stated above, where "h" is the eave height. **(AM 0002) For the relocatable structures provide a minimum factor of safety of 1.5 against sliding or overturning considering wind and dead load only.**

29.4 Foundations **(AM 0002) (Optional for Relocatable Buildings Except Vehicle Maintenance)**

Foundations for permanent structures shall be reinforced concrete continuous spread footings, isolated spread footings, carton formed slabs, grade beams, drilled piers, ribbed mat slab, **(AM 0002) prestressed ribbed mat slab**, or other as required by geotechnical investigation. **(AM 0002) See AEIM page VI-15, paragraph 8.6, Prestressed Designs for additional prestressed design requirements.** Ground floor slab systems shall be slab-on-grade or supported by piers as recommended by geotechnical investigation. Voids under grade beams, where required for expansive soils conditions, shall be formed with wood and not with fiber voids. Refer to Geotechnical insert for additional requirements. **(AM 0002) See Architectural Engineering Instruction Manual (AEIM) Plate C-22 for typical pipe bollard (guard) detail.**

29.5 Concrete Design **(AM 0002) (Optional for Relocatable Buildings Except Vehicle Maintenance)**

29.5.1 Concrete Materials:

- a. Cement: ASTM C 150, Type I-II Portland cement
- b. Fly Ash: ASTM C 618, Class "F" ; fly ash shall not exceed 20% of cement content or 100 Lbs of fly ash per cubic yard of concrete, whichever is less.
- c. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 120
- d. Fine Aggregate: ASTM C 33
- e. Coarse Aggregate: ASTM C 33
- f. Air-Entraining Admixture: ASTM C 260
- g. Accelerating, retarding and water-reducing admixtures: ASTM C 494
- h. Flowing Concrete Admixture: ASTM C 1017, Type 1 or 2
- i. Calcium Chloride shall not be permitted

29.6 Slabs **AM 0002 (Optional for Relocatable Buildings Except Vehicle Maintenance)**

29.6.1 Slabs-on-grade shall be a minimum thickness of 4 inches and reinforced with deformed reinforcing steel bars or welded wire fabric. All floor slab thicknesses shall be designed for the loads associated with the function of the specific area considered. The storage building **(AM 0002) and relocatable vehicle maintenance shall have a minimum 6" concrete slab reinforced with #4 at 12" on center each way. The covered concrete loading dock at site 4900B shall have a minimum 5" concrete slab reinforced with #4 at 12" on center each way.**

29.6.2 Vapor Barrier/Capillary Water Barrier

Provide vapor barrier under all interior floor slabs. Polyethylene sheet shall not be less than 6 mils thick. Provide a 6" capillary water barrier under the vapor barrier.

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29.6.3 Vertical and horizontal runs of conduits and pipes in slabs shall conform to ACI 318. Elevated slabs shall additionally meet the ratings of UL floor assemblies where required. Aluminum conduit and pipes will not be embedded in any concrete.

29.7 Masonry Design

29.7.1 Concrete masonry units shall have a minimum compressive strength of 2000 psi on gross area at 28 days.

29.7.2 Concrete Masonry Materials

- a. Hollow Concrete Masonry Units: ASTM C 90, Grade N, Type I or II
- b. Mortar for Masonry: ASTM C 270, Type S
- c. Grout for Masonry: ASTM C 476
- d. Horizontal Joint Reinforcement: minimum 9-gage deformed wire, ladder-type

29.7.3 Joints shall be 3/8 inch, tooled concave.

29.8 Structural Steel Design

29.8.1 If braced frames are used for all or part of the main lateral force resisting system, the stability of structural system shall not depend on any single member or connection. Redundancy shall be provided either by using multiple bays of tension only x-bracing or by using bracing members that are capable of both tension and compression if bracing is placed in a single bay.

29.9 Steel Decking Design

29.9.1 Form deck shall be galvanized. Metal form material shall be galvanized and a minimum 22 gage.

29.9.2 Steel roof deck material shall be shop painted and be 22 gage minimum. A structural steel roof deck shall be provided under all nonstructural metal roofs.

29.10 Cold Formed Steel Design

29.10.1 Cold Formed Steel Materials:

- a. Galvanized Structural Framing Members 16 gage and heavier: ASTM A 653, Grade D, 50 ksi.
- b. Galvanized Structural Framing Members 18 gage and lighter: ASTM A 653, Grade B, 36 ksi.

29.10.2 Trusses fabricated from cold-formed steel members shall be designed and the drawings stamped by a registered engineer. Minimum gage for members shall be 20 gage.

29.10.3 Cold-formed steel members, their components, and connection material shall have G90 galvanized coating.

29.11 Wood

29.11.1 Retardant Treatment, when required. Recommendations regarding the use of fire retardant treatment are provided in USDA Wood Handbook and

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National Protection Handbook. Pressure impregnation is the preferred treatment method.

29.11.2 Termite control measures will be used in areas prone to termite infestation. Soil will be treated with commonly accepted termite control products prior to construction.

29.12 Other Materials

29.12.1 There are no restrictions on proposing other materials to be used in the structural systems of this project if their strengths and durability can be substantiated by ASTM or other approved laboratory tests, and they satisfy the requirements of the design codes and criteria specified in this document.

29.12.2 All design, manufacture, fabrication, and assembly of other construction materials to be used in structural framing systems shall conform to the applicable design standards and meet specific industry standards as required for each subject material.

29.13 (AM #0002) Preengineered Metal Building Systems

Hairpins and adjacent hardstands shall not be used to resist the horizontal loads acting at the base of metal building system columns. Other methods such as foundation tie beams, anchorage to drilled piers, asphalt coated tie rods, or at-rest soil pressures acting on the foundation elements shall be used. Passive soil pressures will not be used to resist column thrusts unless sufficient supporting justification (including consideration of soil disturbance, moisture conditions, and deflection) is provided. Not more than one-half the full passive soil pressure will be used to resist horizontal thrust from columns.

30. (AM #0002) GENERAL PLUMBING DESIGN REQUIREMENTS

30.1 Plumbing system shall be designed and installed in accordance with the latest edition of the International Plumbing Code and the Fort Hood Installation Guide and Technical Supplement. The Contractor shall be responsible for finish installation of fixtures and piping systems. Each assembled facility shall have a one valve potable water connection and one sewer connection. The water line from the ground to the building shall be provided freeze protection. Gas lines and fixtures shall be installed in accordance with the latest edition of the NFPA 54 National Fuel Gas Code. Use the Unified Facilities Guide Specification.

30.2 Domestic Hot Water

Furnish and install water heaters with sufficient capacity and temperature regulation to handle peak requirements. Hot water delivered to plumbing fixtures in all facilities shall not exceed 120 degrees F.

30.3 Plumbing Fixtures

Plumbing fixtures shall be provided as indicated on architectural drawings. Fixtures shall be low-flow water conserving types, in accordance with the International Plumbing Code and current federal, state and DOD requirements. All handicap fixtures shall be ADA compliant.

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30.4 Drainage

30.4.1 Floor Drains

Floor drains shall be provided in all rooms with gang toilets, mechanical rooms, janitor rooms and for equipment requiring drainage. All floor drain traps shall be automatically primed by single trap primers or where appropriate distribution unit type trap primers.

30.5 Wall Hydrants (Exterior)

Wall hydrants shall be provided at a maximum spacing interval of 200 feet around the exterior wall of the building, with a minimum of two hydrants for each building, one on each opposing wall. Each hydrant shall be box type, freeze proof, with an integral vacuum breaker/backflow preventer. Hydrants shall have 3/4 inch hose connections.

31. FIRE PROTECTION

31.1 Design Standards and Codes

The fire protection design for all facilities shall be in accordance with the following:

INTERNATIONAL CODE COUNCIL, INC
5203 Leesburg Pike, Suite 708
Falls Church, VA 22041-3401

IBC, 2003, International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION
One Batterymarch Park
Quincy, MA 02269-9101

National Fire Codes (NFC) Current as of 2004

UNIFIED FACILITIES CRITERIA

UFC 3-600-01, 2003, Design: Fire Protection Engineering for Facilities
UFGS Guide Specifications

31.1.1.1 Qualifications of Fire Protection Engineer. The design of the fire protection features shall be by a qualified fire protection engineer meeting one of the following conditions: a.) An engineer with a Bachelor of Science or Masters of Science Degree in fire protection engineering from an accredited university engineering program, plus a minimum of 5 years' work experience in fire protection engineering. b.) A registered professional engineer who has passed the National Council of Examiners for Engineering and Surveys (NCEE) fire protection engineering written examination. c.) A registered P.E. in a related engineering discipline with a minimum of 5 years' experience dedicated to fire protection engineering. The name and credentials (education, registration, experience) of the fire protection engineer shall be submitted.

31.1.2 Fire Protection and Life Safety Analysis. A fire protection and life safety design analysis shall be provided for all buildings in the project. The analysis shall include classification of occupancy (both per the IBC and

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NFPA 101); type of construction; height and area limitations (include calculations for allowable area increases); life safety provisions (exit travel distances, common path distances, dead end distances, exit unit width required and provided); building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire-rated walls, doors, fire dampers, etc.; analysis of automatic suppression systems and protected areas; water supplies; smoke control systems; fire alarm system, including connection to the base-wide system; fire detection system; standpipe systems; fire extinguishers; interior finish ratings; and other pertinent fire protection data. The analysis shall include a life safety floor plan for all buildings in the project showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, sprinklered areas, fire extinguisher locations, ratings of fire-resistive assemblies, and other data necessary to exhibit compliance with life safety code requirements.

31.2 Fire Flow Data. Refer to Civil Design for design requirements.

31.3 Sprinkler System

31.3.1 Automatic sprinkler protection shall be provided for buildings as follows:

Classroom Facility. Provide sprinkler protection per the requirements of UFC 3-600-01 and NFPA 101 for Assembly type occupancies.

31.3.2 Design Requirements

Where sprinkler protection is required the facilities shall be fully protected with automatic wet pipe sprinkler systems. Dry pipe systems shall be provided if freeze protection is required. All floors and all areas of the facilities shall be protected. The sprinkler system design shall be in accordance with UFC 3-600-01, NFPA 13, and NFPA 13R where applicable. The sprinkler hazard classifications shall be in accordance with UFC 3-600-01 appendix B and NFPA 13. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01 table 4-1. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to a 2' x 2' splash block at exterior grade.

31.3.3 Sprinkler System

The sprinkler service main shall be a dedicated line. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The service main shall extend from the water distribution system to the building and shall be dedicated for fire protection. The sprinkler entry riser shall include a double check backflow preventer, a fire department connection, and a wall hydrant for testing of backflow preventer. The sprinkler system shall include an indicating control valve, an alarm check valve or dry pipe valve, a water motor alarm and a flow switch reporting to the FACP. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with multiple floors shall be provided with floor control valves for each floor.

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The floor control valve assembly shall be in accordance with NFPA 13, Figure A-5-15.4.2 (b). Clearances for piping passing through floor slabs shall be provided by pipe sleeves with dimensions per NFPA 13, 9.3.4.3. Clearance for all other penetrations shall be per NFPA 13, 9.3.4.

31.3.4 Sprinklers

Sprinklers located in finished areas shall be recessed pendant type.

31.3.5 Exterior Hose Stream

Exterior hose stream demand shall be in accordance with UFC 3-600-01. This shall be 250 gpm for light hazard and 500 gpm for ordinary hazard. Exterior hose stream demand shall be included in the sprinkler system hydraulic calculations.

31.3.6 Backflow Preventer

A double check backflow preventer shall be provided on the fire water main serving each building. This shall be located within the building. An exterior wall hydrant with OS&Y valve shall be provided to allow testing of backflow preventer at design flow as required by NFPA 13.

31.3.7 Fire Department Connection

A fire department connection shall be provided for each building with sprinkler protection. These shall be located to be directly accessible to the fire department.

31.4 Fire Pump

If required a complete fire pump installation shall be provided. Fire pump installation shall be in accordance with UFC 3-600-01, NFPA 13, NFPA 20, and UFGS 13920.

31.5 System Components and Hardware

Materials for the sprinkler system and fire pump system (if required) shall be in accordance with NFPA 13, NFPA 20, and NFPA 24. Sprinkler and standpipe system piping shall be black steel and shall be minimum Schedule 40 for sizes 2 inches and less and minimum Schedule 10 for sizes greater than 2 inches.

31.6 Fire Hydrants

Refer to Site Design for design requirements.

31.6.1 Fire Extinguishers and Cabinets

Refer to Architectural Design for design requirements.

31.7 Fire Alarm and Detection System

Refer to Electrical Design for design requirements.

**32. (AM #0002) GENERAL HEATING, VENTILATING, AND AIR CONDITIONING
REQUIREMENTS**

32.1 Mechanical Requirements

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The mechanical systems will be designed in accordance with the Request for Proposal issued by the Fort Worth Corps of Engineers, ASHRAE standards, International Mechanical code, NFPA Standards and the International Standard Plumbing Code. The Unified Facilities Guide Specifications will be used.

The mechanical system shall comply with the following design criteria and standards:

- ASHRAE Standard 90.1-2001, Energy Standard for Buildings, Except Low-Rise Residential Buildings
- International Mechanical Code.
- ASHRAE Manuals, latest edition.
- NFPA 90A, Installation of Air Conditioning and Ventilating Systems.
- NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.
- ASHRAE Standard 62-2001, Ventilation for Acceptable Indoor Air Quality.
- SMACNA HVAC Duct Construction Standards, latest editions.
- Fort Hood Installation Design Guide And the Technical Supplement.

32.2 Heating, Ventilation, and Air Conditioning (HVAC)

All HVAC units shall be electric. Gas may be used for heating. Unitary equipment shall be applicable with their corresponding ARI and UL standards. Air-cooled split and packaged systems shall have a minimum EER per the following table:

<u>Cooling capacity range (Btu/hr)</u>	<u>Minimum EER</u>
less than 65,000	9.5
greater than or equal to 65,000, less than 135,000	10.3
greater than or equal to 135,000, less than 240,000	9.7
greater than or equal to 135,000	9.5

All air-cooled split and packaged systems shall have a minimum COP of 2.0. Chillers shall have a minimum EER of 9.5 and a minimum COP of 2.8. Thru-the-wall units shall have a minimum EER of 8.5. Where possible use air to air heat pumps with supplemental electric heating

32.3 Ventilation Systems Design

Ventilation for building occupants shall be provided in accordance with ASHRAE Standard 62-2001. The outside air intake shall be located away from fumes including vehicle exhaust, printing process exhaust, generator exhaust, toilet exhaust, etc. Exhaust systems shall exhaust all toilet rooms, bathrooms,

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janitor's closets, lockers, battery storage room, warehouse room, arms vaults, mailrooms, and other spaces as required.

32.4 Design Parameters

32.4.1 Outdoor Design Temperatures shall be 97 degrees F dry bulb/73 degrees F wet bulb summer design and 25 degrees F dry bulb winter design for Fort Hood.

32.4.2 For air conditioned areas the indoor summer design temperature/conditions shall be 78 degrees F/50 percent relative humidity, and indoor winter design temperature shall be 70 degrees F. Include capacity allowance for fresh air quantities in accordance with ASHRAE 62-2001 Ventilation Standards.

32.4.3 Electrical Rooms, Mechanical Rooms and Communications Equipment. Mechanical Rooms and Electrical rooms shall be heated and ventilated. Unit heaters shall be provided in these rooms to maintain a minimum temperature of 40 degrees F for freeze protection. Ventilation rates of 10 and 20 air changes per hour minimum shall be used. A two-speed, thermostatically-controlled fan shall be provided to accomplish the 10 ac/hr and 20 ac/hr rates. The space shall be maintained at a maximum of 10 degrees F above outside design ambient in summer. Ventilation shall be positively introduced within the mechanical room if equipment with atmospheric burners is used in the room. Electrical rooms shall be ventilated and shall maintain a winter design temperature of 55 degrees F. Communications and SIPRNET equipment shall be in an environment that is air-conditioned to maintain 72 degrees F year-round, 24 hours per day.

32.5 Metering: Electricity and Potable Water

Potable water, gas, and electricity shall be metered. Meters shall all have pulse outputs, data collection/communication capability and shall be compatible with Fort Hood Standards. Electric metering is specified in Electrical Design.

32.6 Acoustical Criteria

Systems shall be designed to meet the following noise criteria:

<u>Area</u>	<u>NC Level</u>
General open offices	40
Enclosed offices	30
Lobbies and common areas	40
Conference rooms	30
Sleeping areas	30

Acoustical treatments such as duct lining and sound attenuators shall be used to achieve these levels. Any spaces not specifically listed above shall be coordinated with the user.

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32.7 Personnel Loads

See Architectural portion of RFP for people loads in the facilities.

32.8 Internal Loads

Each office and/or work station receives one personal computer.

Break room equipment includes soda vending machine, full size refrigerator, and coffee maker.

See architectural for additional equipment.

32.9 HVAC Equipment

The equipment described below is a minimum. All materials and equipment provided shall be standard catalogued products of manufacturers regularly engaged in the production of such materials and equipment and shall be of the manufacturers' latest standard design. Equipment shall comply with the requirements of Underwriter's Laboratories, Inc. (UL), Air Conditioning Refrigeration Institute (ARI), American Society for Testing and Materials (ASTM), National Electric Manufacturer's Association (NEMA), American National Standards Institute (ANSI), National Fire Protection Association (NFPA), or other national trade associations as applicable.

Ensure that any new boiler is less than 10MMBtuh and has a low NOx burner installed. This keeps the installation out of requirements under New Source Performance Standards and Title V operating permit revisions. Boilers must still comply with requirements of 30 Texas Administrative Code 106.183

Condensate drains from the evaporator coils will be piped to the sewer line through a trap after the drain pan then through an air gap to a floor drain or raised pipe followed by a trap.

Provide copies of invoices that indicate the amount of refrigerant added to HVAC equipment which contains 50-lbs or more to the DPW Environmental Division's Ozone Depleting Substance Program Manager, Robert Kennedy, 287-8714 in accordance with Fort Hood's Title V air operating permit # O-01659 and 40 CFR 82.

All pieces of floor mounted mechanical equipment shall be installed on a 4-inch thick housekeeping pad. Provide pad 6 inches larger than equipment footprint on all sides. Anchor the pad to the floor.

All suspended equipment shall be properly supported according to the manufacturer's instructions. Provide trapeze hangers for larger pieces of equipment. Provide adequate clearance around all pieces of equipment for periodic maintenance, inspection and cleaning. Service of one piece shall not require disturbance of adjacent equipment.

Each piece of motorized equipment shall be provided with vibration isolators per latest edition ASHRAE Fundamentals Handbook. Nominal deflection and natural frequency of isolation equipment shall be selected based upon equipment size and structural attachment details.

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All strainers and air separators are to be equipped with blow down valves and piped to a floor drain.

Roof mounted equipment is not acceptable. All equipment shall be accessible from the first floor.

Mechanical components shall be installed and mounted in accordance with seismic guidelines per latest edition of ASHRAE Applications Handbook.

32.9.1 Fans

Provide an exhaust fan in each toilet room which has a ventilation rate that meets ASHRAE Standard 62-2001; and in toilet rooms with a single toilet, position the exhaust fan directly above the toilet. Exhaust volume flow rate for toilet area shall be minimum of 2 cfm per square foot of floor area. Toilet fans shall operate with a switch. Exhaust air shall be discharged to the outside.

32.10 System Maintainability

Ensure that filters, controls, control valves, and coils are easily accessible for servicing and cleaning. Isolation valves shall be provided for each terminal unit, zone, branch, long runs, etc. as necessary for proper isolation and maintenance. Coils shall be fully removable without requiring demolition of any building components. Piping configuration at all coils shall include unions to facilitate easy coil removal.

32.11 Air Distribution

Ductwork shall be constructed of sheet metal to SMACNA HVAC Duct Construction Standards, 1995 edition. Ceiling return air plenums shall not be used. All ductwork designated to be constructed at a duct pressure class of 3-inch water gauge or greater shall be pressure tested. Any device (filter, fan, coil or other component) in the air supply, return or exhaust system that will normally operate at these pressures shall be included in the test. The maximum allowable leakage rate shall be in accordance with the SMACNA Leakage Test Manual for the Leakage Class (C) associated with the duct Seal Class. Test procedure, apparatus, and report shall conform to SMACNA. The leakage test shall be satisfactorily completed prior to applying the external duct insulation. Access must be provided to all devices or areas that may require periodic inspection, including but not limited to balancing devices, motor operated dampers, flow measuring stations, smoke/fire dampers, etc. Diffusers shall be located to ensure that the air distribution will completely cover all surfaces of exterior walls with a blanket of conditioned air or may be of a compact design so long as 'dead spots' within the units are avoided. At least one diffuser shall be provided in each habitable room. Diffusers shall be provided with integral opposed blade damper. Diffusers shall be provided with air deflectors as required for proper air flow in the space. Plastic diffusers are prohibited. Ceiling mounted units shall have factory finish to match ceiling color, and be installed with rims tight against ceiling. Sponge-rubber gaskets shall be provided between ceiling or wall and surface-mounted diffusers for air leakage control. Diffuser boots shall be sealed tight to the wall or ceiling they penetrate using duct mastic or caulking. Suitable trim shall be provided for flush-mounted diffusers. Duct collar

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connecting the duct to diffuser shall be airtight and shall not interfere with volume controller. Wall supply registers shall be installed at least 6 inches below the ceiling.

32.11.1 Duct Insulation

All supply, return, and outside air ductwork shall be insulated. Ductwork in areas exposed and subject to abuse shall use rigid insulation. Exposed heating only or exposed return air ductwork shall not be insulated. Exhaust ductwork does not require insulation. Internally lined ductwork shall not be allowed. Insulation shall be faced with a vapor barrier material having a performance rating not to exceed 1.0 perm. Insulation, vapor barrier, and closure systems shall be non-combustible as defined in NFPA 255, with a flame-spread rating of not more than 25, and a smoke development rating of not more than 50, as defined in ASTM E 84. Where insulated ducts pass through fire walls, fire partitions, above grade floors, and fire rated chase walls, the penetration shall be sealed with fire stopping materials.

32.12 Piping and Accessories

Refrigerant piping, valves, fittings, and accessories shall be in accordance with ASHRAE 15 and ASME B13.5. Refrigerant piping, valves, fittings, and accessories shall be compatible with the fluids used and capable of withstanding the pressures and temperatures of the service. Insulation shall be flexible elastomeric cellular insulation.

32.13 Controls

For HVAC systems or equipment that does not come with integral packaged controls, Direct Digital Controls (DDC) shall be used. The thermostats shall be digital with an off-on, and heat and cool switches. The heating and/or cooling setpoints will be fixed, non adjustable. Controls shall comply with the Lonworks Standard.

All buildings will be provided with Digital Control Units for their HVAC units. The Digital Control Units shall be as specified in Specification 13805 One-Way Frequency Modulation(FM) Utility Management and Control System (UMCS) Digital Control Unit.

33. (AM#2) INTERIOR ELECTRICAL DESIGN

33.1 Power Distribution System

In addition to the codes and standards listed in paragraph 28.1, the power distribution system shall be in accordance with UFC 3-520-01, Interior Electrical Systems (http://www.hnd.usace.army.mil/techinfo/ufc/ufc_3-520-01.pdf).

33.1.1 The power distribution system including the conductor and conduit, switchboards, panelboards, service entrance equipment and transformers shall be sized for no less than 25 percent spare capacity. Voltage drop shall not exceed 5 percent from the service transformer to any branch circuit electrical load. In addition, voltage drop shall not exceed 2 percent on feeders from

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the service transformer to the farthest distribution panel and shall not exceed 3 percent on branch circuits.

33.1.2 Switchboards and panelboards shall be located in electrical rooms only. Dry-type transformers shall be located in electrical rooms only.

33.1.3 Switchboards and panelboards shall be equipped with bolt-on circuit breakers sized for the load and available fault current. Series rated breakers shall not be used.

33.1.4 Electrical equipment shall be UL listed for the environment in which it is located.

33.1.5 All mechanical equipment shall have a properly sized disconnect switch, with respect to the National Electrical Code, provided within sight. Should a switch be installed in an exterior environment, then the switch shall be rated for that environment by NEMA.

33.1.6 Wiring shall consist of copper conductors with 600-volt insulation. The minimum conductor size shall be No. 12 AWG. Conductor sizes and ampacities are based on copper. Conductors No. 8 AWG and larger shall be stranded, and conductors No. 10 AWG and smaller diameter shall be solid. Conductors for branch circuits of 120 volts or more than 100 feet long and of 277 volts more than 230 feet long, from panel to load center shall be no smaller than No. 10 AWG.

33.1.7 The electrical distribution systems serving non-linear loads such as large administrative spaces shall be specifically designed for nonlinearity. Feeder neutrals shall be oversized and panelboards shall be equipped with 200% neutral busses. Dry-type transformers shall include a K-4 rating if non-linear loads make up more than 50% of the total load.

33.1.8 Transient Voltage Surge Suppression (TVSS) units may be included as an integral part of the panelboard or shall be hard-wired into the electrical distribution system in accordance with the manufacturer's recommendations utilizing a circuit breaker connection. Units shall be tested in accordance with IEEE C62.45 using an IEEE C62.41 Category B waveform and shall be UL 1449 listed and labeled. Modes of protection shall be normal mode (L-N, L-L) and common mode (L-G, N-G). The unit shall include self-diagnostic and self-testing capabilities, a re-settable transient event counter, and a local audible alarm with mute capability. Service panel surge current rating shall be 300kA minimum per phase and shall be 150kA minimum per phase at all other panels; and shall be rated and marked with a maximum UL suppressed voltage rating of 400V for 120/208 volt applications, and 800V for 277/480 volt applications.

33.1.9 Service grounding shall be in accordance with NEC Article 250. The maximum resistance of a driven ground shall not exceed 25 ohms under normally dry conditions. A separate grounding conductor sized in accordance with the NEC shall be provided in all circuits. The conduit system shall not serve as the equipment ground, and a green grounding conductor shall be provided and sized in accordance with NFPA 70. A copper ground bar shall be provided in each electrical room and communication room. Ground rods shall be of copper-

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clad steel not less than ¾ inch in diameter by 10 feet in length of sectional type driven full length into the earth.

33.1.10 Wiring shall conform to NFPA 70. Unless noted otherwise, wiring shall consist of insulated conductors installed in rigid aluminum conduit, rigid zinc-coated steel conduit, or rigid plastic conduit, or electrical metallic tubing, or electrical nonmetallic tubing, or intermediate metal conduit. Where cables and wires are installed in cable trays, they shall be of the type permitted by NFPA 70 for use in such applications. Wire fill in conduits shall be based on NFPA 70 for the type of conduit and wire insulation specified (based on copper conductors with insulation). Penetrations above grade floor slabs, time-rated partitions and fire walls shall be firestopped. Conduits and tubing, and the support system to which they are attached, shall be securely and rigidly fastened in place to prevent vertical and horizontal movement. Raceways shall not be supported using wire or nylon ties.

33.1.10.1 Metal conduits will be permitted when conduits are required for shielding or other special purposes indicated, or when required by conformance to NFPA 70.

33.1.10.2 Nonmetallic conduit and tubing may be used in damp, wet or corrosive locations when permitted by NFPA 70 and the conduit or tubing system is provided with appropriate boxes, covers, clamps, screws or other appropriate type of fittings.

33.1.10.3 Electrical metallic tubing (EMT) may be installed only within buildings. EMT may be installed in concrete or grout in dry locations, provided with concrete tight fittings. EMT shall not be installed in damp or wet locations, or the air space of exterior masonry cavity walls.

33.1.10.4 Aluminum conduit may be used only where installed exposed in dry locations.

33.1.10.5 Rigid steel conduit or IMC shall be installed in slabs-on-grade, and installed close to the middle of the concrete slabs as practical without disturbing the reinforcement.

33.1.11 Heat tracing shall be provided to protect utilities exposed to freezing temperatures.

33.1.12 All empty conduit shall be sealed, capped, and tagged; and shall include a pull wire.

33.1.13 Full-capacity standard NEMA taps shall be provided in the primary windings of transformers unless noted otherwise. Three-phase transformers shall be configured with delta-wye windings. Transformers, where primary is 600 Volt and less, shall be general purpose, dry-type, self-cooled, provided in a NEMA enclosure rated for the installation location, and be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings.

33.1.14 Each motor shall conform to the hp and voltage ratings, and shall have a service factor and other characteristics that are essential to the proper application and performance of the motors under conditions shown or

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specified. Motors of 1.0 hp or more with open, drip-proof or totally enclosed fan cooled enclosures shall be high efficiency type, unless otherwise noted. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by provisions of another section.

33.2 Receptacle Outlet

33.2.1 Duplex receptacle: 20-ampere, 120 volt, non-locking NEMA type 5-20R, two-pole, three-wire, grounding type with polarized parallel slots.

33.2.1 Weatherproof duplex receptacles shall be provided outside each building entrance and at site mechanical equipment. Receptacles shall be suitable for damp locations and the housings shall be labeled to identify the allowable use. Additional weatherproof receptacles shall be provided such that the long side of each building will have at least one receptacle.

33.2.2 Ground Fault Circuit Interrupter (GFCI) receptacle outlets shall be provided in restrooms, wet locations, outdoors and other locations as required by the NEC or OSHA. GFCI receptacles shall be wired such that the loss of power on one receptacle shall not affect downstream receptacles. GFCI receptacles shall be provided adjacent to lavatories. In multi-lavatory toilets a minimum of one receptacle for every two lavatories shall be provided.

33.2.3 All equipment as identified herein or elsewhere in the RFP that require a receptacle shall be provided a receptacle of the appropriate rating and NEMA configuration to match the plug of said equipment. In addition, other receptacles shall be provided for or as otherwise required for a fully functional facility.

33.2.4 A minimum of one general-purpose 120 volt, 20-ampere duplex receptacle outlet shall be provided on each wall in each room unless otherwise indicated. In rooms where walls exceed 10 feet horizontally, an additional duplex outlet shall be provided for each additional 10 feet of wall or fraction thereof. Receptacle spacing shall not exceed 10 feet. General-purpose receptacles are in addition to special purpose and dedicated outlets for special equipment.

33.2.5 All corridors shall be provided with a minimum of one general-purpose 120 volt, 20-ampere duplex receptacle for floor cleaning equipment. The receptacle(s) shall be spaced in such a manner as to permit full coverage by the equipment with a 35-foot extension cord. Floor receptacles shall not be used.

33.2.6 Each LAN rack shall be provided a dedicated quadraplex receptacle mounted on the side of the rack 6 inches above finished floor (AFF). Each telephone backboard shall be provided two dedicated 120 volt, 20-ampere duplex receptacles in addition to the required general-purpose receptacles.

33.2.7 In each of the mechanical spaces and electrical spaces, a dedicated electrical circuit shall be provided for duplex receptacles to perform general tasks. The number of receptacles to be installed will be dependent on the size of the space, but if a wall space is greater than 10 feet, then a

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receptacle shall be placed on the wall. A minimum of one receptacle shall be placed in each of the spaces.

33.2.8 All equipment as identified herein or elsewhere in the RFP that require a receptacle shall be provided a receptacle of the appropriate rating and NEMA configuration to match the plug of said equipment. In addition, other receptacles shall be provided for or as otherwise required for a fully functional facility. Receptacles provided for copiers, facsimile machines, LAN racks, and common use network printers shall be served by dedicated branch circuits. The contractor shall engage the user for the installation of these dedicated receptacles and circuits.

33.2.9 A dedicated circuit shall be provided to each individual receptacle that provides electricity to an appliance. An appliance is, but not limited to: refrigerator, microwave, washing machine, clothes dryer, and so forth.

33.2.10 Receptacle outlets in finished areas shall be mounted 18 inches AFF unless otherwise indicated or required by code or criteria. Receptacles mounted above counter tops or at built-in desks shall be mounted to assure access from desktop equipment. Receptacles mounted at vanities shall be mounted above the backsplash.

33.2.11 Electrical outlet devices and faceplates shall be white, except faceplates in the vehicle maintenance shops, unit storage, and unfinished areas shall be stainless steel.

33.3 Interior Lighting

33.3.1 Design of the interior lighting system and selection of target illumination levels and uniformity ratios not indicated herein shall comply with the recommendations of the Illuminating Engineering Society of North America (IESNA) Lighting Handbook, 9th Edition. All interior spaces shall be illuminated with compact fluorescent luminaires or linear T8 fluorescent luminaires with the exceptions stated hereafter. Incandescent lighting shall not be allowed in any type of application other than 'reel lights' used for task lighting in the maintenance shops. Exterior usable spaces shall be illuminated with high-intensity discharge fixtures, unless noted otherwise.

33.3.2 Ambient illumination shall provide a generally glare-free, high quality lighting environment. All rooms including closets shall be illuminated. Recessed luminaires shall be provided in all areas with suspended ceilings. Recessed parabolic luminaires with 3-inch minimum blades shall be provided in all open admin areas and private offices. Lensed luminaires shall be equipped with 0.125 inch prismatic virgin acrylic. Surface mounted fixtures in occupied spaces shall be the low profile type (4-inch maximum depth).

33.3.3 Commercial grade luminaires with a residential appearance shall be provided in the barracks modules. Luminaires shall be provided in all barracks module rooms including walk-in closets. Low brightness wall-mounted luminaires with white lens shall be provided over vanity mirrors.

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33.3.4 Fluorescent lamps shall be low mercury content certified to pass the U.S. Environmental Protection Agency (EPA) Toxic Characteristics Leaching Procedures (TCLP) test for non-hazardous waste. Fluorescent lamps shall have a color corrected temperature (CCT) of 3000 degrees Kelvin except fluorescent lamps in vehicle service and maintenance areas shall have a color corrected temperature (CCT) of 4100 degrees Kelvin. Linear fluorescent lamps shall have a minimum color rendering index (CRI) of 75, and compact fluorescent lamps shall have a minimum color rendering index (CRI) of 80.

33.3.5 Fluorescent and compact fluorescent ballasts shall be electronic programmed rapid start capable of starting lamps at the anticipated ambient temperatures. Compact fluorescent ballasts shall include end-of-life protection. A three year full warranty including a \$10 labor allowance shall be provided.

33.3.6 Minimum efficiency standard for fluorescent tubes 4 feet and longer shall be 90 lumens/watt, for fluorescent tubes less than 4 feet shall be 80 lumens/watt, and for compact fluorescent lamps shall be 50 lumens/watt.

33.3.7 Lighting in all toilets (except in barracks), storage rooms, private offices, lounges and laundromats shall be controlled with occupancy sensors. Occupancy sensors may also be used in other areas for energy savings. Areas with lighting controlled by sensors shall have full (100 percent) coverage for walking motion.

33.3.8 Lighting in areas with multiple entrances shall be controlled with three-way and four-way switches or low voltage switches at each entrance. Alternatively, lighting in these areas may be controlled with occupancy sensors.

33.3.9 Facility entrances shall be illuminated with wall mounted luminaires or recessed lensed downlights mounted in the soffit where applicable.

33.3.10 Wall mounted exterior luminaires shall have full cutoff optics and shall be shrouded to obstruct lamp visibility. All wall mounted exterior luminaires shall be cast aluminum with a dark bronze polyester powder coat paint finish and shall be equipped with high pressure sodium lamps.

33.3.11 Photocell controlled wall mounted lighting shall be provided at the entrances to all secure unit storage buildings.

33.3.12 Emergency and exit lighting shall be provided in accordance with NFPA 101, Life Safety Code. Emergency lighting in rooms with fluorescent or compact fluorescent lighting shall consist of self-diagnostic emergency battery packs. Upon loss of power, the emergency lamp(s) within the fluorescent fixture shall light regardless of the light switch position. Emergency lighting in rooms with metal halide lighting shall consist of self-diagnostic wall mounted emergency lighting units. Exit lighting shall have red LED lettering and aluminum housing and face. Exit lights shall have integral battery backup and self-diagnostic capabilities.

33.3.13 Average maintained illumination levels shall be:

Arms Vaults	15 foot-candles
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Auditoriums	20 foot-candles
Barrack Sleeping Rooms	15 foot-candles
Cafeterias	25 foot-candles
Classrooms	50 foot-candles
Communication Distribution Nodes	50 foot-candles
Communication Rooms/Closets	50 foot-candles
Computer Rooms	50 foot-candles
Conference Rooms	30 foot-candles
Corridors	10 foot-candles
Electrical Rooms	15 foot-candles
Emergency Generator Rooms	15 foot-candles
General Office Space	50 foot-candles
Hangars	50 foot-candles
Janitor's Closets	5 foot-candles
Kitchens	70 foot-candles
Laundry	25 foot-candles
Lobbies	15 foot-candles
Lounges	15 foot-candles
Mechanical Rooms	15 foot-candles
Supply Rooms	20 foot-candles
Outdoor Shelters	5 foot-candles
Toilet Facilities	20 foot-candles
Vehicle Maintenance Shops	50 foot-candles
Warehouse - Active Bulk	10 foot-candles
Warehouse - Inactive	5 foot-candles
Warehouse - Rack	20 foot-candles

33.4 Interior Communication Systems

33.4.1 A completely operational communication system including, but not limited to, all necessary raceway, cabling, backboards, outlet boxes, terminations, jacks, and faceplates shall be provided. When a LAN is required, provide LAN racks, patch cords and patch panels. Duplex communication outlets shall consist of two RJ45 jacks in a 4-11/16" square box. Simplex communication outlets shall consist of one RJ45 jack in a 4-11/16" square box. Modular jacks shall be category 6 and shall meet the requirements of EIA ANSI/TIA/EIA-568-B and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1. Modular jack pin/pair configuration shall be T568B per EIA ANSI/TIA/EIA-568-B. Modular jacks shall be unkeyed. The homerun cabling from each duplex outlet back to the communications room/closet shall consist of two 4-pair, Category 6, #24 AWG solid unshielded twisted pair copper. The homerun cabling from each simplex jack outlet back to the communications room/closet shall consist of one 4-pair, Category 6, #24 AWG solid unshielded twisted pair copper. At every outlet, each 4-pair cable shall terminate on a Category 6, 8-pin modular jack. All 4-pair cables from RJ45 jacks shall terminate on Category 6 modular patch panels with RJ-45 connectors, where a LAN is required and if no LAN is required they shall punch down on type 66 terminal blocks that are wall mounted to a plywood backboard. Patch panels shall be mounted on 19" LAN racks. The cable length between instrument and backboard terminations shall not exceed 295 feet. Horizontal cable shall meet the requirements of EIA ANSI/TIA/EIA-568-B.2-1 for Category 6. Cable shall be label-verified. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Cable shall be rated

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CMG or CMP, as appropriate, per NFPA 70. All cabling shall be installed in raceways.

33.4.2 Where a LAN is required, patch cords are required for a complete and functional system and shall be provided. Patch cords shall be cable assemblies consisting of flexible, twisted pair stranded wire with eight-position plugs at each end. Cable shall be label-verified. Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level. Patch cords shall be wired straight through; pin numbers shall be identical at each end and shall be paired to match T568B patch panel jack wiring per EIA ANSI/TIA/EIA-568-B. Patch cords shall be unkeyed. Patch cords shall be factory assembled. Patch cords shall conform to the requirements of EIA ANSI/TIA/EIA-568-B.2-1 for Category 6.

33.4.3 Connecting and cross-connecting hardware for copper cables shall be the same category as the cable it serves. Hardware shall be in accordance with EIA ANSI/TIA/EIA-568-B. Connectors for fiber optic strands shall be ST type with ceramic ferrule material with a maximum insertion loss of .5 dB. Connectors shall meet performance requirements of EIA ANSI/TIA/EIA-568-B. Connectors shall be field installable. Connectors shall utilize adhesive for fiber attachment to ferrule. Connectors shall terminate fiber sizes as required for the service.

33.4.4 Raceways for homerun cabling shall consist of cable tray and 1-inch minimum electrical metallic tubing (EMT) conduit. Raceways for all other facilities shall consist of 1-inch minimum electrical metallic tubing (EMT) conduit only. Raceways shall originate at the outlet and terminate inside the communications room/closet. Each conduit shall constitute a continuous run with NO pull boxes and NO more than two 90-degree bends in the entire run. Raceways consisting of cable trays and conduit shall be used to provide a centralized cable distribution system by providing a continuous cable tray from the communications room through the entire length of the building and centered as much as practical. Cable trays shall be located above ceilings (except in the communications room) and shall be mounted no higher than 6 inches above ceiling. Cable trays shall terminate behind LAN racks. Cable trays shall be sized to provide no less than one half square inch of cross-sectional area per jack served including CATV type "F" connectors. The cable tray fill ratio shall be 40 percent where practical. Conduit shall be provided between the outlet and the cable tray, and shall be physically strapped to the cable tray and attached with an anti-chaffing grommet.

33.4.5 A communication duplex outlet shall be provided alongside each computer receptacle, facsimile receptacle and common use printer receptacle. A communication simplex outlet shall be provided 52 inches AFF in each electrical room, mechanical room and communications room/closet.

33.4.6 Communication outlets in finished areas shall be mounted 18 inches AFF unless otherwise indicated or required by code or criteria. Communication outlets mounted above counter tops or at built-in desks shall be mounted to assure access from desktop equipment.

33.4.7 Communication outlets faceplates shall be white in finished areas and stainless steel in unfinished areas.

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33.4.8 Placement of communication outlets shall be coordinated with the furniture plans.

33.4.9 All empty conduit shall be sealed, capped and tagged and shall include a pull wire.

33.4.10 The communication backboard and LAN racks shall be mounted in an environmentally conditioned space dedicated exclusively to communications equipment.

33.4.11 Patch panels for copper cable shall consist of eight-position modular jacks, with rear mounted type 110 insulation displacement connectors, arranged in rows or columns on 19 inch rack mounted panels. Jack pin/pair configuration shall be T568B per EIA ANSI/TIA/EIA-568-B. Jacks shall be unkeyed. Panels shall be labeled with alphanumeric x-y coordinates. The modular jacks shall conform to the requirements of EIA ANSI/TIA/EIA-568-B, and shall be rated for use with Category 6 cable in accordance with EIA ANSI/TIA/EIA-568-B.2-1 and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1. A single unshielded twisted pair shall be punched down on each jack within the service patch panel as shown on attachment 1E. Terminations shall be blue/white and blue. The number of jacks required within patch panels will be equal to the number of outside pairs of cable entering the building plus 20% spare.

33.4.12 Patch panels for fiber optic strands shall be a complete system of components by a single manufacturer, and shall provide termination, splice storage, routing, radius limiting, cable fastening, storage, and cross-connection. Patch panels shall be modular with ST connectors. Patch panels shall be 19 inch rack mounted panels. Patch panels shall provide strain relief for cables. Panels shall be labeled with alphanumeric x-y coordinates. Patch panel connectors and couplers shall be the same type and configuration as used elsewhere in the system. Fiber optic strands serving each building shall be terminated on LAN rack mounted patch panels.

33.4.13 Terminal blocks shall be wall mounted (on plywood backboard) wire termination units consisting of insulation displacement connectors mounted in plastic blocks, frames or housings. Blocks shall be type 66 which meet the requirements of EIA ANSI/TIA/EIA-568-B, and shall be rated for use with Category 6 cable in accordance with EIA ANSI/TIA/EIA-568-B.2-1 and shall meet the Link Test parameters as listed in EIA TIA/EIA-TSB-67 and supplemented by EIA ANSI/TIA/EIA-568-B.2-1. Blocks shall be mounted on standoffs and shall include cable management hardware. Insulation displacement connectors shall terminate 22 or 24 gauge solid copper wire as a minimum, and shall be connected in pairs so that horizontal cable and connected jumper wires are on separate connected terminals. Terminal blocks are only required in those communication rooms/closets that do not have LAN racks. Size and number of terminal blocks shall be sufficient to accommodate all horizontal copper cabling within the facility.

33.4.14 LAN racks shall be floor mounted, welded steel relay racks with uprights to mount equipment 19 inches wide. Uprights shall be 3 inch deep channel, 1-1/4 inches wide, drilled and tapped 12-24 in a 1/2 inch pattern. Racks shall be provided with a standard top cross member, and predrilled base plate to allow floor fastening. Open frame LAN racks shall be 7 feet in

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height and painted. Back of racks shall be placed a minimum of 3 feet from wall to allow sufficient working clearances for termination of cables. AC outlets shall be provided in each rack. Racks shall be grounded to the building's primary grounding system utilizing a #6 AWG bare solid copper conductor in 3/4 inch conduit.

33.4.15 Cable guides shall be provided and shall be specifically manufactured for the purpose of routing cables, wires and patch cords horizontally and vertically on 19 inch LAN racks. Cable guides shall consist of ring or bracket-like devices mounted on rack panels for horizontal use or individually mounted for vertical use. Cable guides shall mount to racks by screws and/or nuts and lockwashers.

33.4.16 Plywood backboards shall be provided in each communications room/closet on a minimum of three walls. Backboards shall be 5/8" inch by 4 feet wide by the entire length of the wall. The backboard shall be mounted such that the bottom is 2.5 feet above finished floor and the 4 feet width is in the vertical direction. Backboards shall be securely fastened to the walls and shall be painted with white or light colored paint. A #6 AWG bare solid copper conductor in 3/4 inch conduit shall be provided between the backboard and the building's primary grounding system. Conductor shall be centered on backboard in the horizontal direction and 10 feet of slack shall be provided and coiled up on backboard. Although backboard is not continuous it shall be considered as one backboard for dedicated receptacle requirements.

33.4.17 Electrical boxes for communication outlets shall be 4-11/16 inch square by 2-1/8 inches deep with minimum 3/8 inch deep single or two gang plaster ring as required.

33.4.18 Outside plant (OSP) copper cabling shall terminate on protected 66 blocks as shown in attachment E1. The number and size of protector blocks shall be sufficient to terminate all incoming cabling. The protector modules shall be of the two-element gas tube type. Protection modules shall be heavy duty, A>10 kA, B>400, C>65A where A is the maximum single impulse discharge current, B is the impulse life and C is the AC discharge current per ANSI C62.61. The gas modules shall shunt high voltage to ground, fail short, be equipped with an external spark gap and heat coils, and shall comply with UL 497.

33.4.19 Cable trays shall be in accordance with NEMA VE 1 and shall be the trough-type except in the distribution node building trays shall be ladder type and sized as stated in the following paragraph. Cable trays shall be constructed of aluminum or copper-free aluminum or zinc-coated steel. Trays shall include splice and end plates, dropouts, and miscellaneous hardware. Edges, fittings, and hardware shall be finished free from burrs and sharp edges. Fittings shall have not less than the load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius. Radius of bends shall be 12 inches.

33.4.20 Each communication room/closet shall have 2-4" conduits (one with 4-1" inner ducts) stubbed up into the room/closet. Rooms/closets shall also have 2-1" conduits stubbed up inside room for cabling from electric and water meters to interface with the meter interface unit (MIU) that shall also be located in room/closet. An automated meter reading system specification is

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provided as part of this RFP describing the MIU. Conduits shall run to the 5 foot line outside the building. Outside location shall be coordinated with the exterior communications site plan and the civil site plan.

33.4.21 In addition to the requirements of paragraph 28.5 and all subparagraphs, the requirements stated in attachment 2E shall be followed. The attachment is the Ft. Hood Directorate of Information Management Building Communications wiring standard.

33.5 Cable Television (CATV)

33.5.1 A completely operational CATV system including, but not limited to, all necessary raceway, outlet boxes, cabling, terminations, splitters, jacks, and faceplates shall be provided where required. The homerun from each outlet to the backboard shall consist of one RG-6 cable in 1 inch conduit. In buildings with cable trays, the cable tray shall be utilized for the CATV cabling in the same manner as for communication cabling. Each cable shall terminate at a type 'F' connector. At the backboard, the cable shall terminate on splitters. All CATV head-end equipment, incoming service, etc. shall be furnished and installed by the local CATV company. A dedicated area on the communications room/closet backboard shall be utilized for the CATV system. Enough space shall be clear to accommodate equipment to be provided by the local CATV company. Within this dedicated area a #6 AWG bare solid copper conductor in 3/4 inch conduit shall be provided between the backboard and the building's primary grounding system. 10 feet of slack shall be provided coiled up on backboard.

33.5.2 CATV outlets shall be mounted 18-inches AFF unless otherwise indicated. CATV outlets and faceplates shall be white.

33.5.3 All empty conduit shall be sealed, capped and tagged and shall include a pull wire.

33.6 Fire Alarm and Detection System

33.6.1 The fire alarm reporting, evacuation and detection systems for all facilities shall be provided where required by and designed in accordance with the UFC 3-600-01, 2003 (http://www.ccb.org/docs/UFC/3_600_01.pdf), the International Building Code, 2003, and the National Fire Protection Association (NFPA), NFC Codes and Standards, current as of 2004.

33.6.2 The design of the fire detection features shall be by a qualified fire protection engineer meeting one of the following conditions: a.) An engineer with a Bachelor of Science or Masters of Science Degree in fire protection engineering from an accredited university engineering program, plus a minimum of 5 years' work experience in fire protection engineering. b.) A registered professional engineer who has passed the National Council of Examiners for Engineering and Surveys (NCEE) fire protection engineering written examination. c.) A registered P.E. in a related engineering discipline with a minimum of 5 years' experience dedicated to fire protection engineering. d.) An individual who has obtained National Institute for Certification in Engineering Technologies, Fire Alarm Systems, Level III certification (minimum) in accordance with NFPA 72.

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33.6.3 A fire protection and life safety design analysis addressing fire alarm reporting, evacuation and detection systems shall be provided for all buildings in the project as described in "Fire Protection" paragraph herein.

33.6.4 Where fire alarm reporting, evacuation and detection systems are determined to be required, they shall comply with the following:

33.6.4.1 The fire alarm systems shall consist of control panels, RF receiver/transmitters and antenna, manual pull stations, horns and visual indicators, sprinkler water flow switches, valve tamper switches, air pressure supervisory switches, control and monitor modules for non-addressable devices and smoke (including duct detectors) and heat detectors. Fire alarm system for all buildings shall comply with the Americans with Disabilities Act (ADA).

33.6.4.1.1 All Fire Alarm Panels locks and Pull Stations reset keys shall be keyed to be Cat-15. Fire Alarm transmitters shall remain factory keyed.

33.6.4.2 Provide horns throughout the facilities to attain alarm sound levels of no less than 15 dB above normal ambient sound levels at any location within the facilities. Normal ambient sound levels shall include the sound of shower water running. Provide visual indicators in compliance with the ADA (except not required in barracks) and NFPA 72: National Fire Alarm Code.

33.6.4.3 The fire alarm and detection system shall be a complete, supervised fire alarm reporting system. The system shall be activated into the alarm mode by actuation of any alarm initiating device. The system shall remain in the alarm mode until the initiating device is reset and the fire alarm control panel is reset and restored to normal. Alarm initiating devices shall be connected, Style D, to signal line circuits (SLC), Style 6, in accordance with NFPA 72. Alarm notification appliances shall be connected to notification appliance circuits (NAC), Style Z in accordance with NFPA 72. A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all IDC, NAC and SLC will remain functional. The conduit loop requirement is not applicable to the signal transmission link from the local panels (at the protected premises) to the Supervising Station (fire station, fire alarm central communication center). Textual, audible, and visual appliances and systems shall comply with NFPA 72. Fire alarm system components requiring power, except for the control panel power supply, shall operate on 24 Volts dc. Addressable system shall be microcomputer (microprocessor or microcontroller) based with a minimum word size of eight bits. Detection, monitor and control device shall be individually addressable. Devices not inherently addressable (e.g., tamper and flow switches) shall be equipped with addressable monitor and control modules.

33.6.4.4 Vertical and horizontal separation of conduits shall be in accordance with NFPA 72. Conduits shall be red or marked with a red stripe every 10 feet. All junction boxes and pull boxes shall be painted red.

33.6.4.5 A dedicated power supply shall be provided for the fire alarm panel. The power supply shall be equipped with a locking mechanism and marked in red with the words "FIRE ALARM CIRCUIT CONTROL".

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33.6.4.6 Tamper switches shall be provided on all fire alarm system control valves and the Post Indicator Valves (PIV). Coordinate with the other disciplines to determine locations.

33.6.4.7 RF receiver/transmitters shall be Monaco BT-X @139.675MHZ and shall be compatible with proprietary supervising station receiving equipment. Each radio alarm transmitter shall be the manufacturer's recognized commercial product, completely assembled, wired, factory tested, and delivered ready for installation and operation. Transmitters shall be provided in accordance with applicable portions of NFPA 72, NFPA 1221, and 47 CFR 15. Transmitter electronics module shall be contained within the physical housing as an integral, removable assembly. The proprietary supervising station receiving equipment is MONACO D-700 and the transceiver shall be fully compatible with this equipment. At the contractors option, and if UL listed, the transmitter may be housed in the same panel as the fire alarm control panel. Fire alarm control panels and transmitters shall be equipped with 72 hour battery back-up power.

33.6.4.8 Horns shall be surface mounted, with the matching mounting back box recessed vibrating type suitable for use in an electrically supervised circuit. Horns shall produce a sound rating of at least 85 dBA at 10 feet. Horns used in exterior locations shall be specifically listed or approved for outdoor use and be provided with metal housing and protective grilles. Horns shall be capable of being turned off by the mass notification system. When that occurs a supervisory signal shall be transmitted to the fire department.

33.6.4.9 Visual indicators shall conform to the applicable requirements of UL 1971. Appliances shall have clear high intensity optic lens, xenon flash tubes, and output white light. Strobe flash rate shall be between 1 to 3 flashes per second and a minimum of 75 candela. Strobe shall be semi-flush mounted.

33.6.4.10 An omnidirectional, coaxial, halfwave dipole antennas for radio alarm receiver/transmitters with a driving point impedance to match receiver/transmitter output shall be provided. The antenna and antenna mounts shall be corrosion resistant and designed to withstand wind velocities of 100 mph. Antennas shall not be mounted to any portion of the building roofing system.

33.6.4.11 Smoke detectors shall be designed for detection of abnormal smoke densities. Smoke detectors shall be photoelectric type. Detectors shall contain a visible indicator LED/LCD that shows when the unit is in alarm condition. Detectors shall not be adversely affected by vibration or pressure. Detectors shall be the plug-in type in which the detector base contains terminals for making wiring connections. Detectors that are to be installed in concealed (above false ceilings, etc.) locations shall be provided with a remote indicator LED/LCD suitable for mounting in a finished, visible location.

33.6.4.11.1 Photoelectric detectors shall operate on a light scattering concept using an LED light source. Failure of the LED shall not cause an alarm condition. Detectors shall be factory set for sensitivity and shall require no field adjustments of any kind. Detectors shall have an obscuration rating in accordance with UL 268. Addressable smoke detectors shall be

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capable of having the sensitivity being remotely adjusted by the control panel.

33.6.4.11.2 Duct-mounted photoelectric smoke detectors shall be furnished and installed where indicated and in accordance with NFPA 90A. Units shall consist of a smoke detector as specified in paragraph Photoelectric Detectors, mounted in a special housing fitted with duct sampling tubes. Detector circuitry shall be mounted in a metallic enclosure exterior to the duct. Detectors shall have a manual reset. Detectors shall be rated for air velocities that include air flows between 500 and 4000 fpm. Detectors shall be powered from the fire alarm panel. Sampling tubes shall run the full width of the duct. The duct detector package shall conform to the requirements of NFPA 90A, UL 268A, and shall be UL listed for use in air-handling systems. The control functions, operation, reset, and bypass shall be controlled from the fire alarm control panel. Lights to indicate the operation and alarm condition; and the test and reset buttons shall be visible and accessible with the unit installed and the cover in place. Detectors mounted above 6 feet and those mounted below 6 feet that cannot be easily accessed while standing on the floor, shall be provided with a remote detector indicator panel containing test and reset switches. Remote lamps and switches as well as the affected fan units shall be properly identified in etched plastic placards. Detectors shall have auxiliary contacts to provide control, interlock, and shutdown functions. The detectors shall be supplied by the fire alarm system manufacturer to ensure complete system compatibility.

33.6.4.11.3 Combination smoke and heat detectors shall have an audible device (self-contained) and be designed for detection of abnormal smoke densities by the photoelectric principle and abnormal heat by a fixed temperature sensor. Smoke detectors shall be provided with an LED light source. Failure of the LED shall not cause an alarm condition and the sensitivity shall be factory set at a nominal 3 percent and require no field adjustments of any kind. Heat detector portion shall be fixed temperature sensor rated at 135 degrees F. The audible appliances shall have a minimum sound output of at least 85 dBA at 10 feet. Detectors shall contain a visible indicator LED that shows when the unit is in alarm condition. Detectors shall not be adversely affected by vibration or pressure. Heat detectors shall connect to a control panel SLC and shall be self restorable.

33.6.4.12 Manual Pull Fire Alarm Stations shall not use glass rods.

33.7 Mass Notification System (MNS)

A MNS shall be provided in each inhabited building in accordance with UFC 4-021-01, Design and O&M: Mass Notification Systems (<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-021-01.pdf>), to provide real-time information to all building occupants and personnel in the immediate vicinity of the building during emergency situations. For purposes of determining the need for an MNS, an inhabited building is defined as a building or portions of a building routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 430 gross square feet.

33.7.1 The MNS shall be designed and installed by personnel factory-trained by the MNS manufacturer. MNS products shall be from a manufacturer with no

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less than 5 years of experience in producing products similar to those required for mass notification. Upon completion of installation, MNS performance tests shall be completed demonstrating compliance with the requirements herein using test procedures and forms approved by the Contracting Officer's Representative. The Contracting Officer's Representative shall witness performance test and final acceptance test. Upon successful completion of acceptance tests, six (6) complete sets of record drawings and operations and maintenance manuals shall be provided.

33.7.2 The MNS shall consist of a notification appliance network and an autonomous control unit. The autonomous control unit shall be placed in the communications room/closet a wall without the backboard. The MNS shall be independent of the fire alarm system. All MNS components shall be suitable for the environment in which they are installed.

33.7.2.1 The notification appliance network consists of a set of audio speakers located to provide intelligible instructions at all locations in and around the building. The speakers shall be mounted both interior and exterior to the building. Visual strobes separate from fire alarm visual indicators shall also be provided to alert hearing-impaired occupants in buildings designated handicap accessible. Strobes shall be un-marked, with amber colored lenses. Audio speakers shall comply with the requirements for speaker intelligibility in accordance with NFPA 72, Appendix A; and visual strobes shall comply with the requirements for fire alarm visual indicators contained therein.

33.7.2.2 The autonomous control unit shall monitor and control the notification appliance network. A local operator console shall be provided in each facility and connected to the autonomous control unit for local operation. Using the local operator console, building personnel shall initiate delivery of pre-recorded voice messages, provide live voice messages and instructions, and initiate visual strobes (where applicable). Location of local operator console shall be as directed by Ft. Hood DPW during design. The local operator control shall be a separate unit from the autonomous control unit.

33.7.2.2.1 The autonomous control unit shall temporarily deactivate audible fire alarm notification appliances while delivering voice messages. Activation of fire alarm visual indicators and transmission of signals to the base fire department shall not be affected by activation of the MNS. NFPA 72 prohibition against deactivation of fire alarm audible notification appliances is waived to allow MNS override capability.

33.7.2.2.2 Upon deactivation of the audible fire alarm notification appliances, a supervisory signal separate from other fire alarm supervisory signals shall be displayed at the building fire alarm control panel and the supervisory signal shall be transmitted to the base fire department. A readily accessible means shall be provided for emergency response forces to manually override the deactivation function, permitting the fire alarm audible notification appliances to operate independently of the MNS. Use of the manual override feature shall cause a supervisory signal in the fire alarm system.

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33.7.2.2.3 Autonomous control unit monitoring capabilities shall include conductor integrity for strobe, display, fire alarm interface and speaker wiring. The autonomous control unit shall display and log local diagnostic information and shall be capable of repeating pre-recorded messages until terminated.

33.7.2.3 A central control unit shall be provided at the barracks site to allow broadcasting of instructions to all barracks buildings within the site from a single location. The central control unit shall communicate with the autonomous control units transmit commands and messages and receive status information. The central control unit capabilities shall include the following:

33.7.2.3.1 Remotely activate all functions of the individual building systems, including delivery of pre-recorded voice messages.

33.7.2.3.2 Remotely activate concurrent pre-recorded voice messages to multiple individual building systems, including one message for the affected building and a separate message for nearby unaffected buildings.

33.7.2.3.3 Deliver live and recorded voice messages to individual building systems.

33.7.2.4 The communications network shall provide two-way communications between the central control unit and autonomous control units, and shall include redundant (primary and backup) communication links.

33.7.2.5 The MNS shall include 8-hour battery back-up.

33.8 Intrusion Detection System (IDS)

33.8.1 The IDS system shall consist of an empty conduit and box system for Government-furnished and Government-installed (GFGI) IDS equipment. Two 4-inch square (2-1/8 inches deep) junction boxes shall be provided in the protected area at the ceiling level on the wall adjacent to the door. Extend one 1-inch conduit from one of the boxes to the nearest telephone board. Provide a branch circuit in the other box and connect to a panelboard. Provide a red pad-lockable circuit breaker for the IDS power. Power and communication conduits for the IDS shall be galvanized rigid steel run exposed with all the joints welded.

33.8.2 All empty conduit shall be sealed, capped and tagged and shall include a pull wire.

33.8.3 An empty conduit and box IDS system shall be provided in each Modular Documents Vault (if provided).

34. SITE ELECTRICAL DESIGN

34.1 Codes and Standards

The design and construction of the electrical systems shall be in compliance with the most recent editions of the applicable National Fire Protection

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Association Standards, the rules and recommendations of IEEE C2: National Electric Safety Code, UFC 3-550-03N, Design: Power Distribution Systems (http://www.ccb.org/docs/UFC/3_550_03.pdf), and as required herein. Where there is a conflict between the RFP and the codes and standards the most stringent shall apply.

34.2 Site Electrical

Primary power shall be extended to all sites. Specific facility locations shall be as shown on civil sheets. Existing aerial feeders shall be utilized as primary connection points for each site. These feeders are shown **(AM #0002) by attachments provided in Appendix E ELECTRICAL REQUIREMENTS** ~~for on attachment 3E for storage facility and attachment 4E(Bid Option #1) for classroom facility.~~ Available fault current data is also shown for each feeder. Primary extension off-site shall be aerial. Primary extension on-site shall be underground. Aerial primary extensions shall be 3-phase, 4-wire unless noted otherwise. Underground primary extensions to 3-phase electrical equipment shall be 3-phase, 3-wire with cable shield sized to accommodate fault current without damage to the conductor (except at the location of the fault) in accordance with IEEE C2. A separate 600 volt ground wire shall be installed in the duct with the primary extension. In lieu of a ground wire, concentric neutral cable may be utilized.

34.2.1 The existing primary power distribution system at Fort Hood is 7200/12470 volts, three-phase, four-wire, grounded wye. **(AM #0002) The TVM shops shall have installed a pole-mounted transformer bank consisting of 3-15 kVA, 277-480V secondary transformer with #2 THW ACSR quadraplex service drop to shop's service entrance panel "PP".** New class 3 riser poles with fused cutouts, lightning arrestors, and cable terminators shall be provided for both **(Amn#0002) pole-mounted transformers and** transition from aerial to underground service. Power lines for extension of primary aerial service to the sites (if required) shall consist of wood poles and crossarms. Contractor shall match the type of aerial construction utilized at Ft. Hood. The underground primary duct system shall consist of no less than two 4-inch ducts. One duct shall house the phase conductors and the other duct shall act as a spare. The duct system shall be placed a minimum of 36 inches below grade and shall be concrete encased. A pull wire shall be provided in all empty ducts. Cable junctions shall only be in sectionalizing cabinets and primary switches. No splices in manholes shall be allowed.

34.2.2 Scheduled primary outages are not allowed on Ft. Hood. Therefore, all connections to existing lines shall be accomplished while the lines energized.

34.2.3 All pad-mounted transformers shall be rated for three-phase service, connected delta-wye. Medium-voltage ratings of cable terminations shall be 15 kV between phases for 133 percent insulation level. Pad-mounted transformers shall comply with ANSI C57.12.26 and shall be of the radial or loop feed type. Pad-mounted transformer stations shall be assembled and coordinated by one manufacturer and each transformer station shall be shipped as a complete unit so that field installation requirements are limited to mounting each unit on a concrete pad and connecting it to primary and secondary lines. Stainless steel pins and hinges shall be provided. Barriers shall be provided between high- and low-voltage compartments. High-voltage compartment doors shall be interlocked with low-voltage compartment doors to prevent access to any high-voltage section unless its associated low-voltage section door has first been opened. Compartments shall be sized to meet the specific dimensional

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requirements of ANSI C57.12.26. Pentahead locking bolts shall be provided with provisions for a padlock.

34.2.3.1 The high-voltage compartment shall be dead-front construction. Primary switching and protective devices shall include load break switching, oil-immersed, bayonet-type, overload fuse in series with a partial range current-limiting fuse, medium-voltage separable load break connectors, universal bushing wells and inserts or integral one piece bushings and surge arresters. The switch shall be mounted inside transformer tank with switch operating handle located in high-voltage compartment and equipped with metal loop for hook stick operation. Fuses shall be interlocked with switches so that fuses can be removed only when the associated switch is in the "OPEN" position. Adjacent to medium-voltage cable connections, a nameplate or equivalent stenciled inscription shall be provided inscribed "DO NOT OPEN CABLE CONNECTORS UNLESS SWITCH IS OPEN." Surge arresters shall be fully insulated and configured to terminate on a second set of high voltage bushings.

34.2.3.2 Radial-feed load break switches shall be oil-immersed type rated at 15 kV, 95 kV BIL, with a continuous current rating and load-break rating of 200 ampere, and a make-and-latch rating of 10,000 rms amperes symmetrical. Locate the switch handle in the high-voltage compartment. Provide three, two-position, oil-immersed type loop feed sectionalizer switches to permit closed transition loop feed and sectionalizing. Each switch shall be rated at 15 kV, 95 kV BIL, with a continuous current rating and load-break rating of 200 amperes, and a make-and-latch rating of 10,000 rms amperes symmetrical. Locate the switch handle in the high-voltage compartment. Operation of switches shall be as follows:

ARRANGEMENT #	DESCRIPTION OF SWITCH ARRANGEMENT	SWITCH POSITION		LINE B SW		XFMR SW	
		LINE A SW	OPEN CLOSE	OPEN CLOSE		OPEN CLOSE	
1	Line A connected to Line B and both lines connected to transformer		X		X		X
2	Transformer connected to Line A only		X	X			X
3	Transformer connected to Line B only	X			X		X
4	Transformer open and loop closed		X		X	X	
5	Transformer open and loop open	X		X		X	

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34.2.3.3 Transformers shall comply with IEEE ANSI/IEEE C57.12.00, ANSI C57.12.21, and ANSI C57.12.26 and shall be of the mineral oil-insulated type . Transformers shall be suitable for outdoor use and shall have 2 separate windings per phase. Standard NEMA primary taps shall be provided. Where primary taps are not specified, 4, 2-1/2 percent rated kVA high-voltage taps shall be provided 2 above and 2 below rated, primary voltage. Operating handles for primary tap changers for de-energized operation shall be located within high-voltage compartments, externally to transformer tanks. Adjacent to the tap changer operating handle, a nameplate or equivalent stenciled inscription shall be provided and inscribed "DO NOT OPERATE UNDER LOAD." Transformer temperature rise at 60 Hz shall be 60 degrees C.

34.2.4 In transformer low-voltage cable compartments, neutrals shall be provided with fully-insulated bushings. Clamp type cable terminations, suitable for copper or aluminum conductors entering from below, shall be provided as necessary.

34.2.5 Electrical equipment such as pad-mounted transformers, sectionalizing cabinets and primary switches shall be inconspicuously located. No such equipment shall be located within 33 feet of buildings to meet force protection requirements. All pad mounted medium voltage equipment shall be dead-front.

34.2.6 Electrical manholes shall be 6 feet long by 4 feet wide by 6 feet deep (interior dimensions). Strength of manholes and their frames and covers shall conform to the requirements of IEEE C2. Precast-concrete manholes shall have the required strength established by ASTM C 478, ASTM C 478M. Frames and covers shall be made of gray cast iron and a machine-finished seat shall be provided to ensure a matching joint between frame and cover. Cast iron shall comply with ASTM A 48, Class 30B, minimum.

34.2.7 Cathodic protection shall be provided for all metal piping, conduit and equipment installed below grade. Design shall be in accordance with TM 5-811-7, Electrical Design, Cathodic Protection (<http://www.usace.army.mil/inet/usace-docs/armytm/TM5-811-7/>). Protection system shall be sacrificial type utilizing magnesium anodes, and shall have a design current of 2 ma per square foot of bare metal.

34.2.8 Secondary and service conductors shall be installed in conduit and shall be placed a minimum of 24 inches below grade.

34.2.9 Medium voltage cable construction shall be Type MV, conforming to NFPA 70 and UL 1072. Cables shall be manufactured for use in duct applications. Cables shall be soft drawn copper complying with ASTM B 3 and ASTM B 8 for regular concentric and compressed stranding or aluminum alloy 1350, 3/4 hard minimum complying with ASTM B 609, ASTM B 609M and ASTM B 231 for regular concentric and compressed stranding. Cable insulation shall be cross-linked thermosetting polyethylene (XLP) insulation conforming to the requirements of NEMA WC 7 and AEIC CS5 or ethylene-propylene-rubber (EPR) insulation conforming to the requirements of NEMA WC 8 and AEIC CS6. A 133 percent insulation level shall be used on 15 kV rated cables. Cables shall have a semiconducting conductor shield, a semiconducting insulation shield, and an overall copper wire shield for each phase. Cables shall be provided with a polyethylene jacket.

34.3 Not Used

34.4 Utility Routing

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34.4.1 Underground power ducts crossing existing roads shall be jacked and bored.

34.4.2 The installation of underground power lines shall be coordinated with all other utilities including but not be limited to: communications, storm drains, sanitary sewers, water lines, high temp water lines, chilled water lines and gas lines. The minimum separation between electric or communication lines and other utility lines shall be 36 inches vertically and 36 inches horizontally when running adjacent. If utilities are crossing, minimum separation shall be 12 inches vertically. In the case of concrete encasement, the clearances shall be measured from the outermost dimension of the utility line and shall have suitable supports on each side of the upper line to prevent transferring any direct load onto the lower line.

34.4.3 Prior to commencing work on any new underground power line, the Contractor shall stake the route of each line and indicate the exact location of all new ducts, primary sectionalizing cabinets, primary switches, manholes and transformers for approval by the Fort Hood DPW, Ft. Hood DOIM, and by the Contracting Officer's Representative.

34.4.4 New underground utilities including manholes and handholes shall be located outside the tree drip lines of existing trees scheduled to remain. Ducts that cannot be routed around tree drip lines shall be tunneled through the drip line area as approved by the Contracting Officer's Representative.

34.4.5 See paragraph 16 herein for additional utility layout requirements.

34.5 Grounding

The secondary electrical distribution system shall be the solidly grounded neutral type with no intentionally introduced grounding impedance. Grounding shall be in accordance with Article 250, National Electrical Code.

34.5.1 A grounding counterpoise shall be provided around each transformer pad. Ground rods shall be provided at each corner of the pad and connected to the counterpoise. Connections shall be by exothermic weld.

34.5.2 Resistance of driven grounding electrodes shall be tested by the fall-of-potential method. Resistance of the grounding systems shall be a maximum of 25 ohms. The Contracting Officer's Representative shall be immediately notified of resistance readings exceeding 25 ohms.

34.5.3 Grounding conductors shall be copper. Driven grounding electrodes shall be 3/4 inch diameter x 10 feet long solid rods of the following materials: copper or copper-clad steel.

34.5.4 Grounding and bonding shall conform to UL 467.

34.5.5 All pole line hardware shall be grounded in accordance with IEEE C2.

34.6 Metering

34.6.1 Watt-hour meters shall comply with ANSI C12.1 and ANSI C12 and shall be pulse initiator type or electronic type with a pulse output. The meter shall be capable of operating at speeds up to 500 pulses per minute with no false pulses, provide a pulse output of one pulse per kilowatt-hour, and is field programmable. If software or programming device is required, it should

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be supplied with meter. Registers of meters that have an additional non-digital display for kilowatt demand shall be pointer-type.

34.6.2 An automatic meter reading system (AMRS) to monitor electricity, gas, and water usage from building 4219 shall be provided for all facilities. Guide specification 13815, Automated Meter Reading System is included in this RFP and shall be utilized for this system.

34.6.3 Fort Hood utilizes an Automatic Meter Reading System (AMRS), manufacturer by Teldata Solutions, to monitor electricity, gas, and water usage. The system consists of a central computer (located in Bldg. 4219) and numerous field devices called Meter Interface Units (MIU). The MIU is capable of connecting to and recording information from up to four different utility meters of various types. The recorded information can be either an encoded signal or a pulse signal. The MIU has a built-in modem that is used to transmit the recorded information to the central computer (via the telephone system) base on a preprogrammed schedule. The recommended model is the DC-4 which is battery powered with an approximately life of 15 years. The DC-4 must be requested with dual (two) PB-01 boards that are required to record pulse-type signals. When data logging is required, the IX-4D is recommended.

34.6.4 The MIU shall be installed (with associated wiring) in accordance with manufacturer's recommendation. The MIU shall be located inside the facility as close as possible to the servicing telephone block. However, the total distance from the MIU to any utility meter shall not be more than 500 feet. Communication cable shall be installed between the meter(s) and the MIU. Cable shall be #22 AWG, solid, shielded, three wire (color-coded: red, green, and black), with 600VAC insulation and PVC outer jacket installed in conduit. Allow a 1-2 feet pigtail at the MIU and the connected meter(s) for subsequent connection. A telephone outlet shall be installed adjacent to the MIU and telephone cable shall be installed to the backboard or patch panel. Due to the special setup requirements, the Fort Hood staff will make final cable connection(s) to the MIU and the meter(s), to include programming the MIU and connection to the telephone system (254-287-7283).

34.6.5 The Teldata Solutions utilizes proprietary type protocol that has been developed for particular encoder-type meters that are typically utilized for gas and water meters (Note: all water meters shall be encoded-type. Also, some electrical meters are capable of providing an encoded signal. The encoded signal is the preferred choice because of the addition data it supplies (i.e. serial number, tampering information, etc). On the other hand a pulse signal is limited to only providing a digital signal (on/off). However, when an encoded-type meter is not available, the minimum pulse requirement is as stated in paragraph 29.7.1.

34.6.6 Current Transformer (CT) rating for metering shall be based on the service rating, mission of the facility, and minimum (base) load to provide the best overall accuracy of the load being measured. Per CT performance curves, meters should be accurate down to 5% of the CT rating. For loads exceeding 1000A, submetering or check metering system shall be considered. The following table is provided to indicate suggested CT ratings.

<u>SUGGESTED CT RATINGS</u>					
Service Capacity	CT Rating	Accuracy Class	RF	Max Load	Min Load
225A	200/5	.3 thru B-0.1	4.0	800A	10A
300A	300/5	.3 thru B-0.2	3.0	900A	15A

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400A	200/5	.3 thru B-0.1	4.0	800A	10A
600A	400/5	.3 thru B-0.2	4.0	1600A	20A
800A	400/5	.3 thru B-0.2	4.0	1600A	20A
1000A	600/5	.3 thru B-0.5	3.0	1800A	30A
1200A	600/5	.3 thru B-0.5	3.0	1800A	30A
1500A	800/5	.3 thru B-0.5	2.0	1600A	40A
1800A	1500/5	.3 thru B-0.9	1.5	2250A	75A
2000A	1500/5	.3 thru B-0.9	1.5	2250A	75A
2500A	2000/5	.3 thru B-1.8	1.5	3000A	100A
3000A	3000/5	.3 thru B-1.8	1.33	3990A	150A

34.6.7 The MIUs can be obtained from [Teldata Solutions](#), First Point, 1001 SW Fifth Ave, Suite 500, Portland OR 97204, (503) 425-5100 ext. 5127. Utility meter(s) can be supplied from various metering vendors. A list of tested compatible meters may be obtained from the Ft. Hood DPW Energy Management Team, (254) 287-7283.

34.7 (AM #0002) Exterior Lighting

34.7.1 Design of the exterior lighting system and selection of target illumination levels and uniformity ratios not indicated herein shall comply with the recommendations of the Illuminating Engineering Society (IES) Lighting Handbook, 9th Edition. Exterior luminaires shall have full cutoff light distribution patterns as defined in Chapter 22 of the IES Lighting Handbook and shall be individually fused. Exterior lighting shall be provided for Site 2 (LZ Phantom), Site 3 (49000 block), Site 6 (Motor Pool), Building 4615, & Building 4617 hardstands. All exterior lighting shall utilize pulse-start high pressure sodium or metal halide lamps and ballasts. Hardstand lighting shall be served by photocell controlled, zoned lighting contactors. Each contactor/zone shall be equipped with Hand-Off-Auto switches. Controls shall be inconspicuously located in NEMA 3R enclosures. Locations, enclosures and mounting methods shall be approved by the Contracting Officer's Representative prior to installation.

34.7.2 Hardstand areas shall be illuminated to 0.5 foot-candle using full cutoff photocell-controlled floodlight luminaires mounted on metal poles. Highmast lighting is to be used for Site 3 (49000 block) & Site 6 (Motor Pool). It is preferable to locate fixtures along the perimeter, but if uniformity cannot be achieved then poles may be placed within the hardstand, but must be properly protected from vehicle damage. Highmast light locations shall be approved by Directorate of Aviation Operations. Lamps shall not exceed 400 watts.

34.7.3 Poles shall be aluminum or steel, and shall be the pole manufacturer's standard design for supporting the number of fixtures provided. Poles shall be round in shape. Rectangular poles are unacceptable. Poles shall be designed for a wind velocity of 70 mph at the base of the pole, for a wind gust factor of 1.3, and for the height and drag factors recommended by AASHTO LTS-4. The effective projected area of luminaires and other pole-mounted

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devices shall be taken into account in pole design. Poles shall have grounding provisions. The type of pole shaft material provided shall not be mixed for the same type of fixture types. Grounding connection shall be provided near the bottom of each metal pole and at each concrete pole anchor base. Scratched, stained, chipped, or dented poles shall not be installed.

34.7.4 Poles shall be mounted on concrete foundations with anchor bolts provided by the pole manufacturer. Foundations shall be sized for the loading. Poles located in turf or landscaped areas shall be mounted on concrete foundations extending 2 inches above finished grade (AFG). Poles located in hardstand areas shall be mounted on 30-inch round concrete pedestals extending no less than 36 inches AFG.

34.7.5 Exterior lighting shall utilize 480 volts as much as possible.

34.8 Site Communications

34.8.1 Specific facility locations shall be as shown on civil sheets. Location of other facilities indicated herein are indicated by attachments provided in Appendix E ELECTRICAL REQUIREMENTS.

34.8.1 New ducts installed underneath vehicular streets shall be jack and bored. Handholes shall be 3 x 4 x 4 feet minimum and may be utilized on any site to facilitate the distribution of cabling. Handholes shall not be installed in areas subject to vehicular traffic and shall not be used as part of off-site duct systems. Ducts shall be sealed, capped and tagged in handholes.

34.8.2 New concrete manholes shall be 6' wide x 8' long x 7' deep. Manholes shall be equipped with pulling-in irons, cable racks, and ground rod, and conform to the requirements of REA Bulletin 345-151. Manholes shall be designed so that the main trunk conduits enter and exit near the center of the ends, and lateral conduits exit on the sides near the corners. Manholes may be pre-cast or cast in place. Maximum distance between manholes shall be 500 feet. When new ducts are required to penetrate existing manholes, the manholes shall be core drilled and ducts shall be extended into manholes and sealant applied between the manhole and the duct. If fiber optic splicing is required in manholes, then 50 feet of slack per splice shall be provided as required by RUS REA Bulletin 1735F.

34.8.3 The following are the outside cable plant requirements per building type. Barracks shall be provided with 12 PR copper. Dayrooms shall be provided with 6 PR copper. Bn HQ's shall be provided with 200 PR copper and 24 strand FO. Company ops shall be provided with 50 PR copper and 12 strand FO. Company ops supply facilities shall be provided with 4 PR copper. Stand alone classrooms shall be provided with 25 PR copper and 12 strand FO. Maintenance shops shall be provided with 12 PR copper. Administration buildings shall be provided with 50 PR copper and 12 strand FO. Arms rooms shall be provided with 6 PR copper. Unit storage (17,000 block only) shall be provided with 12 PR copper. (Am #0004) Van dock commo bldg shall be provided with 25 PR copper and 12 strand FO. All copper and fiber optic cabling from the service point of origin to the individual sites shall be based on the total requirements of the site. For example, if there are sixteen company ops buildings on a site then contractor shall provide as a minimum 800 pairs (50

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PR x 16) of cable to the site, and 192 strands (12 strand x 16) of FO cable to the site. Arms rooms do not figure into these calculations because they will be fed from company ops buildings.

34.8.4 The following work shall be accomplished to provide service to and on the 4900 and 49000 block site. Service shall be obtained from Bldg. 4304. See Attachment 21E for location of Bldg. 4304 and the 4900 and 49000 Blk. There is an existing manhole on the NW corner of 77th St. and Warehouse Ave. A 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) shall be provided from this manhole. Duct system shall traverse westward along Warehouse Ave. to the west side of 80th St. where a manhole shall be provided at the NW corner of 80th St. and Warehouse. A minimum of two other manholes shall be provided to ensure the maximum distance between manholes does not exceed 500 feet. Duct system shall be jack and bored under 78th, 79th, and 80th streets. From the new manhole on the NW corner of 80th St. and Warehouse a 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) shall be provided along 80th St to the NW corner of 80th and Sante Fe where another manhole shall be placed. An additional manhole shall be placed and centered between these two manholes. This manhole shall be used to feed the new maintenance shop and administration building located on the east side of the site. From the manhole located on the NW corner of 80th St. and Sante Fe four more manholes shall be placed to the west along Sante Fe Ave. 500 feet apart from each other on center. These manholes shall be interconnected with a 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts). The two maintenance shops on the west side of the site shall be fed from the farthest western placed manhole. Service from the manholes shall be direct buried. There are existing spare ducts that can be used between Bldg. 4304 and the manhole on the corner of 77th St. and Warehouse. Provide 300PR copper cable to the new manhole providing service to the admin building. Provide 60 strand FO cable to same manhole. From that manhole to the westernmost manhole being provided along Sante Fe Ave. provide 200 PR copper and 48 strand FO cable. These cables shall be spliced into the 300 PR cable and 60 strand cable respectively. Work inside Bldg. 4304 shall include providing Avaya fiber high density distribution panels C.C. 700-007-214 LST1U-144/9 to terminate 60 strand FO cable. In addition, provide and mount new Reltec C-388 protector blocks on existing main distribution frame and terminate 300 PR copper cable on these blocks.

34.8.5 Service to site 2 (LZ Phantom) shall be obtained by extending a new duct system to the existing manhole shown on attachment 22E. Fiber and copper shall be spliced in the existing manhole.

34.8.6 Service to Site 1 (DOL Area) shall be obtained by extending fiber and copper to communications room in building 89010 located adjacent to site.

34.8.7 The following work shall be accomplished to provide service to site 20 (Tank Destroyer & 78th). Service shall be obtained from Bldg. 4304. See Attachment 23E. There is an existing manhole on the NW corner of 77th St. and Warehouse Ave. A 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) shall be provided from this manhole. There are existing spare ducts that can be used between Bldg. 4304 and the manhole on the corner of 77th St. and Warehouse. Work inside Bldg. 4304 shall be as indicated for the 4900 and 49000 block site.

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34.8.8 The following work shall be accomplished to provide service to and on the 3500 block site. Service shall be obtained from Bldg. 36000 (Darnall hospital). See Attachment 24E for location of Bldg. 36000 and the 3500 Blk. There is an existing manhole located on the southwest corner of 58th St. and Darnall loop. From this manhole a new 4-way 4-inch concrete encased duct system shall be placed under 58th St. by jacking and boring. From the first new manhole on the east side of 58th St., a new 2-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) shall be provided to a new handhole located adjacent to the communication distribution node building. The ducts shall continue from the handhole into the building and stub up adjacent to a wall. In addition, four spare 4" conduits shall be provided between the handhole and the building. They shall be stubbed up adjacent to the other two ducts inside the building. From the manhole on the corner of 58th St. and Darnall loop provide a 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) parallel to the existing duct system heading back west along Darnall loop and then heading south terminating inside Bldg. 36000. Ducts shall be core drilled into two more manholes along this path and into Bldg. 36000. Ducts shall be jack and bored underneath Darnall loop. From the distribution node building the contractor has the option of providing service to the new buildings on site either underground or aurally. If underground, then contractor shall follow the same requirements provided for the 800 block. If aerial, then a single copper and a single fiber optic cable, sized to provide unique homerun service to all buildings, shall leave the distribution node building underground and traverse to a riser pole. From the riser pole cabling shall be distributed throughout the site aurally including service drops. Each service drop shall be individually spliced off of the main cable. As buildings are fed, main cable will reduce in size by the number of pairs or strands provided in the drop. It is preferred that aerial distribution be utilized. Work inside Bldg. 36000 shall include providing Avaya fiber high density distribution panels C.C. 700-007-214 LST1U-144/9 to terminate outgoing fiber optic cabling. Number and size of panels shall be sufficient to terminate all outgoing strands.

34.8.9 The following work shall be accomplished to provide service to and on the 800 block site. Service shall be obtained from Bldg. 11002 (RSC-3). See Attachment 25E for location of Bldg. 11002 and the 800 Blk. There is an existing manhole across the street from Bldg. 9211 on the west side of 21st St. that shall be the connection point for a 2-way 4-inch concrete encased duct system (one with 4-1" inner ducts) that shall be provided to a new handhole. The handhole shall be located adjacent to the communication distribution node building located on the site. The ducts shall continue from the handhole into the building and stub up adjacent to a wall. In addition, four spare 4" conduits shall be provided between the handhole and the building. They shall be stubbed up adjacent to the other two ducts inside the building. If the length of the new duct system exceeds 500 feet, a minimum of one new manhole shall be provided per requirement stated elsewhere in RFP. North of the existing manhole on 21st St. is another manhole. These two manholes have spare ducts between them that can be utilized for new cabling. Between the northernmost of the above mentioned manholes and Bldg. 11002 there are no empty ducts, but there is enough spare capacity within these ducts to run new copper and fiber optic cabling from Bldg. 11002. All new buildings on the site shall be provided service from the node distribution building. Individual cables shall be provided directly to each building without going

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into any other building. Cabling between the distribution node building and all other buildings shall be direct buried outside the 5 foot building line. Work inside Bldg. 11002 shall include providing Avaya fiber high density distribution panels C.C. 700-007-214 LST1U-144/9 to terminate outgoing fiber optic cabling. Number and size of panels shall be sufficient to terminate all outgoing strands. In addition, mount new Reltec C-388 protector blocks on existing main distribution frame and terminate all outgoing copper cabling on these blocks.

34.8.10 The following work shall be accomplished to provide service to and on the 200/300 block site. Service shall be obtained from Bldg. 13. See Attachment 26E for location of Bldg. 13 and the 200/300 Blk. Existing duct shall be used for cabling between Bldg. 13 and MH100 located to the east of Bldg. 14. From MH100 provide a 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts) parallel to the existing duct system heading north along 52nd St. and then heading east along 761st Tank Battalion Ave. to MH170 on the corner of 761st Tank Battalion and 37th St. New ducts shall be core drilled into existing manholes along the entire path. From MH170, a minimum (actual design may require more to accommodate cabling) of 2-4" concrete encased duct (one with 4-1" inner ducts) system shall be provided to a new handhole that shall be located adjacent to the communication distribution node building. The ducts shall continue from the handhole into the building and stub up adjacent to a wall. In addition, four spare 4" conduits shall be provided between the handhole and the building. They shall be stubbed up adjacent to the other two ducts inside the building. All new buildings on the site shall be provided service from this building. Individual cables shall be provided directly to each building without going into any other building. Cabling between the distribution node building and all other buildings shall be direct buried outside the 5 foot building line. Work inside Bldg. 13 shall include providing Avaya fiber high density distribution panels C.C. 700-007-214 LST1U-144/9 to terminate outgoing fiber optic cabling. Number and size of panels shall be sufficient to terminate all outgoing strands.

34.8.11 The following work shall be accomplished to provide service to sites 25, 26 , & 27 (9500 BLK). Service shall be obtained from Bldg.11002. See Attachment 27E. A new duct & manhole system shall be provided between sites and Bldg. 11002. Duct system shall be 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts). Work in Bldg. 11002 shall be as described by service to the 800 block site as previously described.

34.8.12 The following work shall be accomplished to provide service to sites 8 (16000 BLK) & 9 (17000 BLK). Service shall be obtained from Bldg.11002. See Attachment 28E. A new duct & manhole system shall be provided between sites and Bldg. 11002. Duct system shall be 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts). Work in Bldg. 11002 shall be as described by service to the 800 block site as previously described.

34.8.13 The following work shall be accomplished to provide service to site 30 (HAAF Area). Service shall be obtained from Bldg.7008. See Attachment 29E. A new duct & manhole system shall be provided between sites and Bldg. 7008. Duct system shall be 4-way 4-inch concrete encased duct system (one duct with 4-1" inner ducts). Work inside Bldg. 7008 shall include providing fiber high density distribution panel to terminate outgoing fiber optic cabling. Number and size of panels shall be sufficient to terminate all

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outgoing strands. In addition, mount new protector blocks on existing main distribution frame and terminate all outgoing copper cabling on these blocks.

34.8.14 Service to site 10 (1900 BLK) shall be obtained by extending a new duct system to the existing manhole shown on attachment 30E. Cable shall be spliced in the existing manhole.

34.8.15 As a result of the demolition of buildings 4476 and 4452 new fiber optic (FO) cabling work shall be accomplished. These two buildings serve as distribution nodes for other buildings on the site. All work shall be accomplished before the buildings are demolished. All work required in the following three subparagraphs shall be accomplished in a continuous time frame to minimize downtime.

34.8.15.1 Building 4476 is currently fed aurally with a 96 strand FO cable as is shown on attachment 3E. As can be seen from the attachment, the 96 strand cable is feeding (via splicing) a 60 strand aerial cable, a 36 strand aerial cable, and 2-12 strand aerial cables from inside the building. One of the 12 strand cables is feeding building 4475 which is scheduled to be demolished so this cable shall be removed with no new connectivity required. Connectivity, however, for the other three cables shall be reestablished (via splicing in a new splice case) at the nearest pole to Bldg. 4476 from which the 96 strand cable is attached to. The portion of the 96 strand cable between this pole and building 4476 shall be removed. If necessary, new cabling shall be provided to accomplish this work to avoid splices between the new splice case and the termination point inside the existing buildings. In addition, if new cabling is provided contractor shall clear all existing cabling that has been replaced from poles and shall remove it from the splice cases inside the buildings.

34.8.15.2 Building 4452 is currently fed aurally with a 168 strand FO cable as is also shown on attachment 3E. As can be seen from the attachment, the 96 strand cable is feeding (via splicing) a 72 strand aerial cable, a 24 strand aerial cable, and 2-12 strand aerial cables from inside the building. Connectivity shall be reestablished (via splicing in a new splice case) at the nearest pole to Bldg. 4452 from which the 168 strand cable is attached to. The portion of the 168 strand cable between this pole and building 4452 shall be removed. If necessary, new cabling shall be provided to accomplish this work to avoid splices between the new splice case and the termination point inside the existing buildings. In addition, if new cabling is provided contractor shall clear all existing cabling that has been replaced from poles and shall remove it from the splice cases inside the buildings.

34.8.15.3 Buildings 4465, 4466, and 4467 shown on attachment 3E are going to be demolished. These buildings are each fed with a 12 strand FO aerial cable originating in Bldg. 4449. Each cable shall be removed including removal from the splice case inside Bldg. 4449. Building 4468 is also going to be demolished. This building is fed with a 12 strand FO aerial cable originating in Bldg. 4470. Cable shall be removed including removal from the splice case inside Bldg. 4470.

34.9 A grounding grid shall be installed in parking area east of building 4616. Grid shall consist of bare buried cable and ground rods using a 30 foot square spacing.

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34.10 (AM #0004) Airfield lighting shall be in accordance with UFC 3-535-01 DESIGN STANDARDS FOR VISUAL AIR NAVIGATION FACILITIES. Existing taxiway lights shall be relocated to edge of new apron. Landing pad shall be provided with perimeter lighting using semiflush omnidirectional yellow lights. Existing circuiting shall be extended to serve the new and relocated lighting.

~~35. (AM #0002) NOT USED STORAGE BUILDING (17000 BLOCK)~~

~~35.1 Facilities~~

~~The project will include functional space for a Storage Facility. The facility shall be permanent construction.~~

~~35.2 Design Criteria~~

~~35.2.1 Army Standard Design~~

~~There are no Army Standard Designs for this facility.~~

~~35.2.2 Rudimentary drawings~~

~~Rudimentary Drawings included in this RFP include a functional floor plan of the Storage Facility. This drawing is included for design and coordination purposes. Further development of this design will require coordination with the using agency and base personnel. Revisions and refinements to this rudimentary drawing, or any other drawings and plans developed as a result of this proposal, should be expected during the course of design development until final design is achieved.~~

~~35.2.3 Handicapped Access~~

~~The Storage Facility will not be handicapped accessible.~~

~~35.2.4 Signage~~

~~Provide exterior signage in accordance with paragraph Exterior Signage and interior signage in accordance with paragraph INTERIOR DESIGN/Signage Requirements. Provide a building number sign.~~

~~35.2.5 Fire Extinguishers~~

~~Provide fire extinguishers as required by Installation requirements or code. Fort Hood's DPW Fire Dept. no longer provides fire extinguishers.~~

~~35.3 Site Design Requirements~~

~~See site development paragraphs such as SITE DESIGN AND CONSTRUCTION, UTILITY LAYOUT AND DESIGN, STORM DRAINAGE, GAS DISTRIBUTION, and SITE GRADING.~~

~~35.4 Architectural Design Requirements~~

~~35.4.1 General~~

~~The storage facility shall be one story permanent structure on pre engineered structural frame that meets the functional requirements specified below. Creative solutions that minimize delivery time are encouraged.~~

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~~35.4.2 Functional Layout~~

~~Provide one 16,000 SF Storage Facility. Functional requirements for the facility type are described below. See diagrammatic floor plan attached to the end of this Section.~~

~~a. **Large Storage Bays** 7 @ 2,000 SF ea. Provide a pair of 4' x 8' doors (8' opening) at the ends of each storage bay. Provide a hook mounted fire extinguisher inside each set of doors. Bays are separated with padlockable wire mesh partitions. The bottom of the roof trusses/structures are also secured with wire mesh to provide a barrier (12' minimum height). Subdivide the bays with wire mesh as per user requirements.~~

~~b. **Small Storage Bays** 2 @ 1,000 SF ea. Provide a pair of 4' x 8' doors (8' opening) for each storage bay. Provide a hook mounted fire extinguisher inside each set of doors. Bays are separated with padlockable wire mesh partitions. The bottom of the roof trusses/structures are also secured with wire mesh to provide a barrier (12' minimum height). Subdivide the bays with wire mesh as per user requirements.~~

~~Provide paved access at all entrances meeting applicable codes. See electrical requirements for communications requirements.~~

~~35.4.3 Room Sizes~~

~~Room sizes shown on the attached sketch are minimum clear space. A diagrammatic floor plan is provided at the end of this Section. Minor adjustments to room sizes may be acceptable if furnishings and functionality of the rooms are unaffected. A minimum clear space of 12 feet 0 inches is required between the floor and the bottom of the roof trusses/structure.~~

~~35.4.4 Finishes~~

~~Exterior and interior finishes shall be the manufacturer's standard commercial grade products and standard colors except where noted otherwise. Exterior and interior finishes shall conform to Fort Hood design standards. The floor finish in the Storage Facility shall be sealed concrete. Provide color/finish sample boards.~~

~~35.4.4.1 Exterior Finishes~~

~~The following exterior finishes are approved for the Storage Facility:~~

- ~~• Metal Panel Roof with fluoropolymer finish.~~
- ~~• Roof drainage system (gutters, downspouts, flashing) with same type finish.~~
- ~~• Metal Panel siding with fluoropolymer finish.~~
- ~~• Aluminum Windows & Doors with anodized finish.~~
- ~~• Steel Doors and frames with factory primed, site painted finish.~~

~~35.4.4.2 Metal Siding~~

- ~~• Use channel iron side girts for a structural steel bldg that have added sag rods. Connect one and one half zee to the channel iron by either welding or screws. Connect the siding to the zee.~~

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- ~~Install liner panels on the side walls of maintenance shops to protect the building insulation and to facilitate cleaning.~~
- ~~The side girt spacing is critical for a metal building because the spacing determines the profile of the sidewall panel. A deeper profile will allow a wider spacing of the side girt. Consideration should be given to availability of the profile specified.~~
- ~~Provide hidden fastener sidewall panels if possible.~~
- ~~Provide a vapor barrier and insulation barrier around the insulated envelope of the building. Without a well constructed vapor barrier there is a tendency to create an environment for growing mold.~~

~~35.4.4.3 Doors~~

~~Exterior doors shall swing out. Exterior doors shall be insulated hollow metal. Exterior entry doors shall be SDI Level 3.~~

~~35.4.4.4 Door Hardware~~

~~All doors shall have minimum three heavy duty (grade 1) hinges per leaf. Locksets at exterior doors shall have 1 inch dead bolts. Exterior outswinging doors shall have non-removable hinge pins. Provide three Master keys that cannot be reproduced. Provide five sets of keys for each lock.~~

~~35.4.4.5 Rainwater Management~~

~~Provide gutters, downspouts and concrete splash blocks. If gutters are not feasible for this type of structure, provide a means of diverting rainwater from the roof around all personnel doors is required; provide justification.~~

~~35.4.5 Interior Design~~

~~35.4.5.1 Structural Interior Design~~

~~See paragraph STRUCTURAL INTERIOR DESIGN (SID).~~

~~35.4.5.2 Interior Chain Link Fencing~~

- ~~Make sure security fence fabric is 12 feet high. Fabric is normally 9 gauge, verify with user.~~
- ~~Do not detail a top pipe rail for the security fence.~~
- ~~Chain link fence fabric shall be secured with wire ties not clips.~~

~~35.4.5.3 Comprehensive Interior Design~~

~~See paragraph COMPREHENSIVE INTERIOR DESIGN (CID).~~

~~35.4.5.3.1 CID Furnishing List~~

~~Typical CID items to specify are, but not limited to:~~

- ~~Support desks~~
- ~~Bulletin Boards, Porcelain Marker Boards~~
- ~~Chairs all kinds, including stools~~
- ~~Files all kinds~~
- ~~Storage all kinds~~

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- ~~Tables all kinds~~
- ~~Waste cans various sizes~~
- ~~Include all specific/special items as required by the Government/user.~~

~~35.5 Structural Design Requirements~~

~~See paragraph STRUCTURAL DESIGN REQUIREMENTS.~~

~~35.6 Plumbing Design Requirements~~

~~35.6.1 General~~

~~Plumbing system shall be designed and installed in accordance with the latest edition of the International Plumbing Code and the Fort Hood Installation Design Guide. The Contractor shall be responsible for finish installation of fixtures and piping systems. Gas lines and fixtures shall be installed in accordance with the latest edition of the NFPA 54 National Fuel Gas Code. Use Unified Facilities Guide Specifications.~~

~~35.6.2 Wall Hydrants (Exterior)~~

~~Wall hydrants shall be provided at a maximum spacing interval of 200 feet around the exterior wall of the building, with a minimum of two hydrants for each building, one on each opposing wall. Each hydrant shall be box type, freeze proof, with an integral vacuum breaker/backflow preventer. Hydrants shall have 3/4 inch hose connections. The piping supplying the wall hydrants shall be drainable.~~

~~35.7 Heating And Ventilating Requirements~~

~~35.7.1 Mechanical Requirements~~

~~The mechanical systems will be designed in accordance with the Request for Proposal issued by the Fort Worth Corps of Engineers, ASHRAE standards, International Mechanical code, NFPA Standards and the International Standard Plumbing Code. The Unified Facilities Guide Specifications will be used.~~

~~The mechanical system shall comply with the following design criteria and standards:~~

- ~~ASHRAE Standard 90.1-2001, Energy Standard for Buildings, Except Low-Rise Residential Buildings~~
- ~~International Mechanical Code.~~
- ~~ASHRAE Manuals, latest edition.~~
- ~~NFPA 90A, Installation of Air Conditioning and Ventilating Systems.~~
- ~~NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.~~
- ~~ASHRAE Standard 62-2001, Ventilation for Acceptable Indoor Air Quality.~~
- ~~SMACNA HVAC Duct Construction Standards, latest editions.~~
- ~~NFPA 54, National Fuel Gas Code.~~
- ~~Fort Hood Installation Design Guide.~~

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~~35.7.2 Heating and Ventilation~~

~~The HVAC system shall be energy efficient and provide heating and forced ventilation only. The heating of the building will be accomplished by means of gas fired vented infrared heaters.~~

~~35.7.3 Ventilation Systems Design~~

~~Ventilation for building occupants shall be provided in accordance with ASHRAE Standard 62-2001.~~

~~35.7.4 Design Parameters~~

~~35.7.4.1 Outdoor Design Temperatures shall be 25 degrees F dry bulb winter design for Fort Hood.~~

~~35.7.4.2 Storage area will be heated to 40 degrees F for freeze protection. Indoor summer design temperature shall be 10 degrees F above the outdoor design temperature. Include capacity allowance for fresh air quantities in accordance with ASHRAE 62-2001 Ventilation Standards.~~

~~35.7.5 Heating And Ventilating Equipment~~

~~The equipment described below is a minimum. All materials and equipment provided shall be standard catalogued products of manufacturers regularly engaged in the production of such materials and equipment and shall be of the manufacturers' latest standard design. Equipment shall comply with the requirements of Underwriter's Laboratories, Inc. (UL), Air Conditioning Refrigeration Institute (ARI), American Society for Testing and Materials (ASTM), National Electric Manufacturer's Association (NEMA), American National Standards Institute (ANSI), National Fire Protection Association (NFPA), or other national trade associations as applicable.~~

~~All suspended equipment shall be properly supported according to the manufacturer's instructions. Provide trapeze hangers for larger pieces of equipment. Provide adequate clearance around all pieces of equipment for periodic maintenance, inspection and cleaning. Service of one piece shall not require disturbance of adjacent equipment.~~

~~Each piece of motorized equipment shall be provided with vibration isolators per latest edition ASHRAE Fundamentals Handbook. Nominal deflection and natural frequency of isolation equipment shall be selected based upon equipment size and structural attachment details.~~

~~Mechanical components shall be installed and mounted in accordance with seismic guidelines per latest edition of ASHRAE Applications Handbook.~~

~~35.7.6 Fans~~

~~Provide exhaust fans and motorized louvers sufficient to meet ASHRAE Standard 62-2001.~~

~~35.7.7 System Maintainability~~

~~Ensure that all equipment is easily accessible for servicing and cleaning.~~

~~35.7.8 Piping and Accessories~~

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~~Piping, valves, fittings, and accessories shall be in accordance with NFPA 54.~~

~~35.7.9 Controls~~

~~For HVAC systems or equipment that does not come with integral packaged controls, Direct Digital Controls (DDC) shall be used. The thermostats shall be digital with an off on switch. The heating temperatures will be fixed non adjustable.~~

~~35.8 Fire Protection~~

~~35.8.1 Design Standards and Codes~~

~~The fire protection design for all facilities shall be in accordance with the following:~~

~~INTERNATIONAL CODE COUNCIL, INC
5203 Leesburg Pike, Suite 708
Falls Church, VA 22041-3401~~

~~IBC, 2003, International Building Code~~

~~NATIONAL FIRE PROTECTION ASSOCIATION
One Batterymarch Park
Quincy, MA 02269-9101~~

~~National Fire Codes (NFC) Current as of 2004~~

~~UNIFED FACILITIES CRITERIA~~

~~UFC 3-600-01, 2003, Design: Fire Protection Engineering for Facilities
UFGS Guide Specifications~~

~~35.8.2 Qualifications of Fire Protection Engineer~~

~~The design of the fire protection features shall be by a qualified fire protection engineer meeting one of the following conditions: a.) An engineer with a Bachelor of Science or Masters of Science Degree in fire protection engineering from an accredited university engineering program, plus a minimum of 5 years' work experience in fire protection engineering. B.) A registered professional engineer who has passed the National Council of Examiners for Engineering and Surveys (NCEE) fire protection engineering written examination. C.) A registered P.E. in a related engineering discipline with a minimum of 5 years' experience dedicated to fire protection engineering. The name and credentials (education, registration, experience) of the fire protection engineer shall be submitted.~~

~~35.8.3 Fire Protection and Life Safety Analysis~~

~~A fire protection and life safety design analysis shall be provided for all buildings in the project. The analysis shall include classification of occupancy (both per the IBC and NFPA 101); type of construction; height and area limitations (include calculations for allowable area increases); life safety provisions (exit travel distances, common path distances, dead end distances, exit unit width required and provided); building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire rated walls, doors, fire dampers, etc.; analysis of~~

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~~automatic suppression systems and protected areas; water supplies; smoke control systems; fire alarm system, including connection to the base wide system; fire detection system; standpipe systems; fire extinguishers; interior finish ratings; and other pertinent fire protection data. The analysis shall include a life safety floor plan for all buildings in the project showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, sprinklered areas, fire extinguisher locations, ratings of fire resistive assemblies, and other data necessary to exhibit compliance with life safety code requirements.~~

~~35.8.4 Fire Flow Data. Refer to Civil Design for design requirements.~~

~~35.8.5 Sprinkler System~~

~~35.8.5.1 General~~

~~Automatic sprinkler protection shall be provided for buildings as follows:~~

~~Supply/Storage Facility. Provide sprinkler protection per the requirements of UFC 3-600-01. Per UFC 3-600-01, 4-2.2, sprinkler protection is required for facilities that contain equipment or materials that are considered to be mission essential (for example TA 50 equipment). Per UFC 3-600-01, 6-10.1 storage facilities must have complete automatic sprinkler protection. Sprinkler protection must be based on Class IV commodities as defined by NFPA 13.~~

~~35.8.5.2 Design Requirements~~

~~Where sprinkler protection is required the facilities shall be fully protected with automatic wet pipe sprinkler systems. Dry pipe systems shall be provided if freeze protection is required. All floors and all areas of the facilities shall be protected. The sprinkler system design shall be in accordance with UFC 3-600-01, NFPA 13, and NFPA 13R where applicable. The sprinkler hazard classifications shall be in accordance with UFC 3-600-01 appendix B and NFPA 13. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01 table 4-1. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to a 2' x 2' splash block at exterior grade.~~

~~35.8.5.3 Sprinkler System~~

~~The sprinkler service main shall be a dedicated line. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The service main shall extend from the water distribution system to the building and shall be dedicated for fire protection. The sprinkler entry riser shall include a double check backflow preventer, a fire department connection, and a wall hydrant for testing of backflow preventer. The sprinkler system shall include an indicating control valve, an alarm check valve or dry pipe valve, a water motor alarm and a flow switch reporting to the FACP. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with~~

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~~multiple floors shall be provided with floor control valves for each floor. The floor control valve assembly shall be in accordance with NFPA 13, Figure A-5-15.4.2 (b). Clearances for piping passing through floor slabs shall be provided by pipe sleeves with dimensions per NFPA 13, 9.3.4.3. Clearance for all other penetrations shall be per NFPA 13, 9.3.4.~~

~~35.8.5.4 Sprinklers. Sprinklers located in finished areas shall be recessed pendant type.~~

~~35.8.5.5 Exterior Hose Stream. Exterior hose stream demand shall be in accordance with UFC 3-600-01. This shall be 250 gpm for light hazard and 500 gpm for ordinary hazard. Exterior hose stream demand shall be included in the sprinkler system hydraulic calculations.~~

~~35.8.5.6 Backflow Preventer. A double check backflow preventer shall be provided on the fire water main serving each building. This shall be located within the building. An exterior wall hydrant with OS&Y valve shall be provided to allow testing of backflow preventer at design flow as required by NFPA 13.~~

~~35.8.5.7 Fire Department Connection. A fire department connection shall be provided for each building with sprinkler protection. These shall be located to be directly accessible to the fire department.~~

~~35.8.6 Fire Pump. If required a complete fire pump installation shall be provided. Fire pump installation shall be in accordance with UFC 3-600-01, NFPA 13, NFPA 20, and UFGS 13920.~~

~~35.8.7 System Components and Hardware. Materials for the sprinkler system and fire pump system (if required) shall be in accordance with NFPA 13, NFPA 20, and NFPA 24. Sprinkler and standpipe system piping shall be black steel and shall be minimum Schedule 40 for sizes 2 inches and less and minimum Schedule 10 for sizes greater than 2 inches.~~

~~35.8.8 Fire Hydrants. Refer to Civil Design for design requirements.~~

~~35.8.8.1 Fire Extinguishers and Cabinets. Refer to Architectural Design for design requirements.~~

~~35.8.9 Fire Alarm and Detection System. Refer to Electrical Design for design requirements.~~

~~35.8.10 Electrical Design Requirements~~

~~See paragraphs INTERIOR ELECTRICAL DESIGN and SITE ELECTRICAL SYSTEMS.~~

36. (AM #0002) NOT USED CLASSROOM BUILDING (16000 BLOCK)

~~36.1 FacilitiesThe project will include functional space for a Classroom Facility. The facility shall be permanent construction.~~

~~36.2 Army Standard Design~~

~~—There are no Army Standard Designs for this facility.~~

~~36.3 Design Criteria~~

~~36.3.1 Rudimentary drawings~~

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~~Rudimentary drawings included in this RFP include a functional floor plan of the Classroom Facility; it is attached to the end of this Section. This drawing is included for design and coordination purposes. Further development of this design will require coordination with the using agency and base personnel. Revisions and refinements to this rudimentary drawing, or any other drawings and plans developed as a result of this proposal, should be expected during the course of design development until final design is achieved.~~

~~36.3.2 Handicapped Access~~

~~The Classroom Facility shall be handicapped accessible. Ramps and sidewalks shall be provided for handicapped access to the Classroom Facility. The number of parking spaces and site access for the physically disabled shall be two spaces per facility. One parking space shall be van accessible.~~

~~36.3.3 Signage~~

~~Provide exterior signage in accordance with paragraph Exterior Signage and interior signage in accordance with paragraph INTERIOR DESIGN/Signage Requirements. Provide a building number sign.~~

~~36.3.4 Fire Extinguishers~~

~~Provide fire extinguishers as required by Installation requirements or code. Fort Hood's DPW Fire Dept. no longer provides fire extinguishers.~~

~~36.3.5 Slabs on Grade~~

~~All interior slabs on grade, including storage rooms, shall be underlain by a moisture vapor barrier consisting of lapped polyethylene sheeting having a minimum thickness of 6 mils and a minimum AM 0002 4 6 inches thick capillary water barrier of open graded, washed pea gravel, or crushed stone. Concrete slabs shall be jointed around columns and along supported walls to minimize cracking due to possible differential movement.~~

~~36.4 Site Design Requirements~~

~~See site development paragraphs such as SITE DESIGN AND CONSTRUCTION, UTILITY LAYOUT AND DESIGN, STORM DRAINAGE, WATER DISTRIBUTION (OPTION 1), SANITARY SEWER (OPTION 1), GAS DISTRIBUTION, and SITE GRADING.~~

~~36.5 Architectural Design Requirements~~

~~36.5.1 General~~

~~The facility shall be a one story permanent building on pre engineered structural frame that meet the functional requirements specified below. Creative solutions that minimize delivery time are encouraged.~~

~~36.5.2 Functional Layout~~

~~Provide one 4,500 SF Classroom Facility. Functional requirements for this facility type are:~~

- ~~• Vestibule 50 SF. Provide resilient flooring.~~

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- ~~**Lobby** 125 SF. Provide one fire extinguisher in a flush mounted wall cabinet. Provide resilient flooring.~~
- ~~**Training Storage Area** 300 SF. Provide resilient flooring. Storage for 140 extra folding chairs.~~
- ~~**Classrooms** 2 @ 1500 SF ea. 100 students ea. Provide student chairs with cushions and folding writing surfaces. Provide Dry Erase whiteboards and a manual projector screen. Provide a folding partition between the classrooms so they may be converted into one large classroom. Provide two fire extinguishers in flush mounted wall cabinets (one by each exit door). Provide carpet tile flooring.~~
- ~~**Restrooms** 2 @ 200 SF ea. Provide ADA compliant restrooms for males and females. Male restrooms shall include 2 lavatories, 2 urinals, and 2 toilets. Female restrooms shall include 3 lavatories, and three toilets. Provide ceramic tile flooring with drains in each restroom.~~
- ~~**Janitor's Closet** 15 SF. Constructed from noncombustible materials, and positive latching on door. Provide ceramic tile flooring with floor drain.~~
- ~~**Communications Closet** 80 SF. Secure communications closet for equipment and panelboard. Conditioned space with cipher lock at door. See electrical requirements. Provide sealed concrete slab.~~
- ~~**Electrical** Room 100 SF. Constructed from noncombustible materials, one hour fire rating in walls, and door to exterior. Provide sealed concrete slab.~~
- ~~**Mechanical Room** 200 SF. Constructed from noncombustible materials, one hour fire rating in walls, and door to exterior. Provide sealed concrete slab with floor drain.~~

~~These requirements are the minimum. Areas indicated are net square feet, and may be exceeded.~~

~~Arrange spaces in an efficient manner with simple circulation.~~

~~All facilities shall include stairs or ramps and entry landings at all entrances to meet applicable codes. All janitor closets shall have mop sink, mop rack, 6 lf of storage shelving and floor space for storage of janitorial equipment. Except where noted otherwise, all facilities shall have mechanical and electrical spaces to accommodate required equipment with space for maintenance/repair access without having to remove other equipment. See electrical requirements for communications room/SIPRNET communication room requirements.~~

~~36.5.3 Room Sizes~~

~~Room sizes shown above are minimum clear space. A diagrammatic floor plan is provided at the end of this Section. Minor adjustments to room sizes and arrangements may be acceptable if furnishings and functionality of the rooms are unaffected. Ceilings at occupied areas shall be a minimum 8 feet 0 inches. Ceilings in classrooms shall be a minimum of 10 feet 0 inches.~~

~~36.5.4 Finishes~~

~~Exterior and interior finishes shall be the manufacturer's standard commercial grade products and standard colors except where noted otherwise. Exterior and interior finishes shall conform to Fort Hood design standards. The floor finish in all restrooms, janitor closets, and all other wet areas shall be ceramic tile. Suspended acoustic tile ceiling is not permitted for~~

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~~restrooms, janitor closets, communications rooms, and mechanical and electrical rooms. Provide color/finish sample boards.~~

~~36.5.4.1 Exterior Finishes~~

~~The following exterior finishes are approved for the Classroom Facility:~~

- ~~• Standing Seam Metal roof with fluoropolymer finish.~~
- ~~• Roof Drainage System (gutters, downspouts, flashing) with same type finish.~~
- ~~• Masonry Veneer designed in the context of nearby facilities/structures.~~
- ~~• Aluminum Windows & Doors with anodized finish.~~
- ~~• Steel Doors and frames with factory primed, site painted finish.~~

~~36.5.4.2 Masonry~~

- ~~• Where cavity wall CMU/brick construction is used, provide for damp proofing outside of the CMU.~~
- ~~• Provide masonry walls around mechanical rooms for sound insulation and fire protection.~~
- ~~• Provide masonry screen walls around mechanical yards for appearance and security. The screen wall shall be provided with a lockable gate.~~
- ~~• Provide a vapor barrier and insulation barrier around the insulated envelope of the building. Without a well constructed vapor barrier there is a tendency to create an environment for growing mold.~~

~~36.5.4.3 Standing Seam Metal Roof System~~

- ~~• Provide metal deck over roof structure with 3 1/2 inch or 4 1/2 inch zee purlins screw attached through the metal deck to the roof structure. The standing seam roof will be attached to the zee purlins. Rigid building insulation will be inserted below the zee purlins and is sandwiched between the metal deck and the standing seam metal roof (on large OMA or MCA projects). This system provides a firm surface for the DPW maintenance workers to walk on periodically. If frequent visits to the roof are anticipated, grated walkways may be attached directly to the standing seams with no roof penetrations. This system protects the building insulation from damage and from the effects of gravity/creep that has the tendency to pull exposed insulation down over a period of years.~~
- ~~• Provide minimum roof slopes of 2 on 12 rather than the historical 1 on 12. Experience shows that most roofs with a 1 on 12 roof slope ultimately have one or more flat spots created by construction tolerances, steel fabrication errors, and some installation problems. Low sloped roofs depend upon caulk to prevent leakage. For a 1 on 12 sloped roof, water will back uphill 12 inches for every 1 inch depth of water. Therefore, any overlap, roof penetration and exposed fastener is immersed in water.~~
- ~~• Provide full length standing seam roof sheets. We have had contractors ship panels up to 55 feet in length by truck to Fort Hood. We have had at least one contractor roll 150 feet long standing seam roof sheets on site. The one piece roof sheets eliminate all end laps, thus reducing the potential roof leaks.~~

~~36.5.5 Doors And Windows~~

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~~Windows will utilize 1-inch insulated units with 1/4-inch exterior laminated glass and 1/4-inch laminated interior glass. All exterior glazing shall be 3/4-inch laminated glass consisting of two 1/8" thick glass panes bonded together with a minimum 0.030-inch thick PVB interlayer. For insulating glass units, the inner pane shall be laminated glass as described above. Glazed door and window frames shall resist an equivalent static design load of 1 lb per square inch applied to surface of glazing and frame with frame deformation not exceeding 1/60 of the unsupported member lengths. Steel members may be designed using ultimate yield stresses and aluminum members may be designed based on a 0.2 percent offset yield strength. Glazing shall have a minimum frame bite of 1 inch. Door/window frame connections to building, hardware and associated connections and glazing stop connections shall resist equivalent static design load of 10.8 psi for glazing panels with vision area less than or equal to 10.8 square feet and 4.4 psi for glazing panels with vision area greater than 10.8 square feet and less than 32 square feet. Loads shall be applied to the surface of the glazing and the frame. Connections and hardware may be designed based on ultimate strength for steel and 0.2 percent offset yield strength for aluminum. All exterior doors must swing out. Exterior doors shall be insulated hollow metal. Exterior entry doors shall be SDI Level 3. Windows shall be energy efficient with double pane insulating glass units. Operable windows at administrative offices are preferred. All windows shall have mini blinds. All operable windows shall have insect screens and locks.~~

~~36.5.6 Door Hardware~~

~~All doors shall have minimum three heavy-duty hinges per leaf. Locksets at exterior doors shall have deadlock feature. Exterior outswinging doors shall have non-removable hinge pins. Provide three Master keys that cannot be reproduced. Provide five sets of keys for each lock.~~

~~36.5.7 Sound Isolation~~

~~Partitions at classrooms shall have STC 49 for sound isolation from all adjacent rooms.~~

~~36.5.8 Building Numbers~~

~~Facility shall have a building number sign located on two faces, permanently affixed to building. Location, design, size and colors shall be in accordance with Fort Hood Installation Design Guide. Coordinate with Fort Hood, through the Contracting Officer, for assigned building numbers for each facility.~~

~~36.5.9 Rainwater Management~~

~~Provide gutters, downspouts and concrete splash blocks. If gutters are not feasible for the type of structure provided, provide a means of diverting rainwater from the roof around all personnel doors is required; provide justification.~~

~~36.5.10 Interior Design~~

~~Furnish SID and CID submittals in accordance with paragraph STRUCTURAL INTERIOR DESIGN (SID) and COMPREHENSIVE INTERIOR DESIGN (CID). The preparation of the Comprehensive Interior Design is part of the bid item.~~

~~36.5.10.1 Signage Requirements~~

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~~Interior signage is an important item that is to be fully integrated with the architecture and building related finishes. All signage shall be in accordance with the Department of the Army Technical manual, Signage, TM 5-807-10 and installation sign standards (See the Fort Hood Installation Design Guide). All signs are to be from one manufacturer and shall match in color and style. All room sign copy is to be Helvetica medium with a ratio of height and width to meet Americans with Disabilities Act (ADA) requirements. Signs are to be provided for all interior doors. Installation shall be wall mounted, on the latch side of the door with the center of the sign installed 5 feet 0 inch above the finish floor and 3 inches from the outside edge of the metal door frame. Where conditions do not allow signs to be mounted directly adjacent to the door, install signs on the wall at the nearest point to the latch side. All signs are to have a permanent room number sign. All signs are to be a minimum overall dimension of 9 inches wide and 6 inches high. Under the visual printed room number an integral, tactile, corresponding, Grade 2 Braille indicating the room number. The second two slides are to be window insert slides to accommodate personnel changes or room name changes. Inserts shall allow the user to insert computer generated copy behind acrylic face insert. BB5 sign types shall be 6 inches wide by 8 inches high. Mechanical rooms and other building system room and service support rooms (BB4) including restrooms (BB7) are to have permanent room signs with copy that has raised room numbers and permanent room names. Copy is to be raised, tactile, letters and Grade 2 Braille indicating the room number and room name. All signs are to be permanently and mechanically attached to the building. Double sided tape will not be accepted. Signage message shall be coordinated with the Contracting Officer before ordering or installation. Provide Emergency Egress sign plaques (BB8) that indicate "YOU ARE HERE" and the path of egress. These signs are to be fully coordinated with the installation Fire Marshall at the review submittal design phase and before fabrication and installation. The Fire Marshall is to review the correct placement and quantity of these signs within the building and also review the proposed path of egress that will be graphically illustrated on the sign. Suggested placements for these signs are to be determined before installation.~~

~~36.5.10.2 Acoustical Ceilings~~

~~Provide ceiling tiles that are rated for use in high humidity conditions, referred to as an RH90 ceiling tile. Ceiling tile is to be attractive and look as normal as any cellulose backed ceiling tile but shall have a mineral fiber backing. This is to provide non hygroscopic materials in the facility to minimize the possibility of moisture retention and mildew.~~

~~36.5.10.3 Toilet Accessories~~

~~Toilet accessories for Fort Hood Projects shall use the following items for consistency to their Cleaning Service Contract:~~

- ~~• Toilet Tissue Dispenser: Georgia Pacific model # 56T, Eclipse Quickview, 9" twin Jumbo, bath Tissue Dispenser, Color: Smoke.~~
- ~~• Paper Towel Dispenser: Georgia Pacific Model # 84T, Eclipse Quickview, Lever control, Roll Towel Dispenser, Color: Smoke.~~

~~36.5.10.4 Comprehensive Interior Design~~

~~36.5.10.4.1 CID Furnishing List~~

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~~Typical CID items to specify are, but not limited to:~~

- ~~— Bookcases & Display Cases~~
- ~~— Bulletin Board, Porcelain Marker Boards~~
- ~~— Chairs all kinds, including stools~~
- ~~— Desks freestanding technical~~
- ~~— Files all kinds~~
- ~~— Podium/lecture stands~~
- ~~— Storage all kinds~~
- ~~— Tables all kinds~~
- ~~— Waste cans various sizes~~
- ~~— Classroom chairs and tables~~
- ~~— Include all specific/special items as required by the Government/user.~~

~~36.6 Structural Design Requirements~~

~~See paragraph STRUCTURAL DESIGN REQUIREMENTS.~~

~~36.7 Plumbing Design Requirements~~

~~See paragraph PLUMBING DESIGN REQUIREMENTS.~~

~~36.8 Heating, Ventilating, And Air Conditioning Requirements~~

~~See paragraph HEATING, VENTILATING, AND AIR CONDITIONING REQUIREMENTS.~~

~~36.9 Fire Protection~~

~~See paragraph FIRE PROTECTION.~~

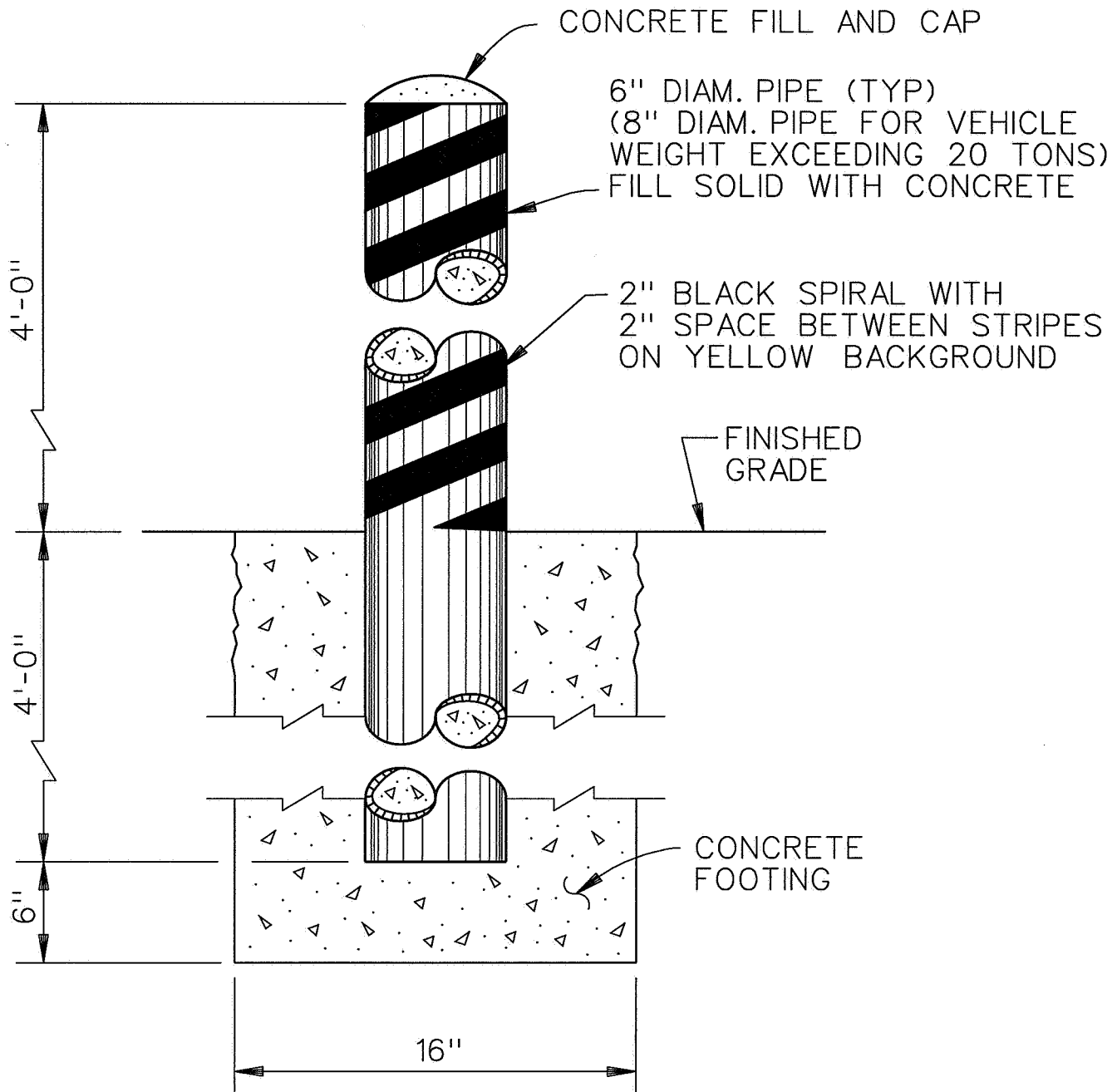
~~36.10 Electrical Design Requirements~~

~~See paragraph INTERIOR ELECTRICAL DESIGN and SITE ELECTRICAL SYSTEMS.~~

37. READY FOR OCCUPANCY

The Contractor shall develop a checklist similar to Appendix SAMPLE OF A READY FOR OCCUPANCY CHECKLIST to check each building and ensure it is ready for occupancy. Each building shall be checked with a Contracting Officer's Representative.

---End of Section---

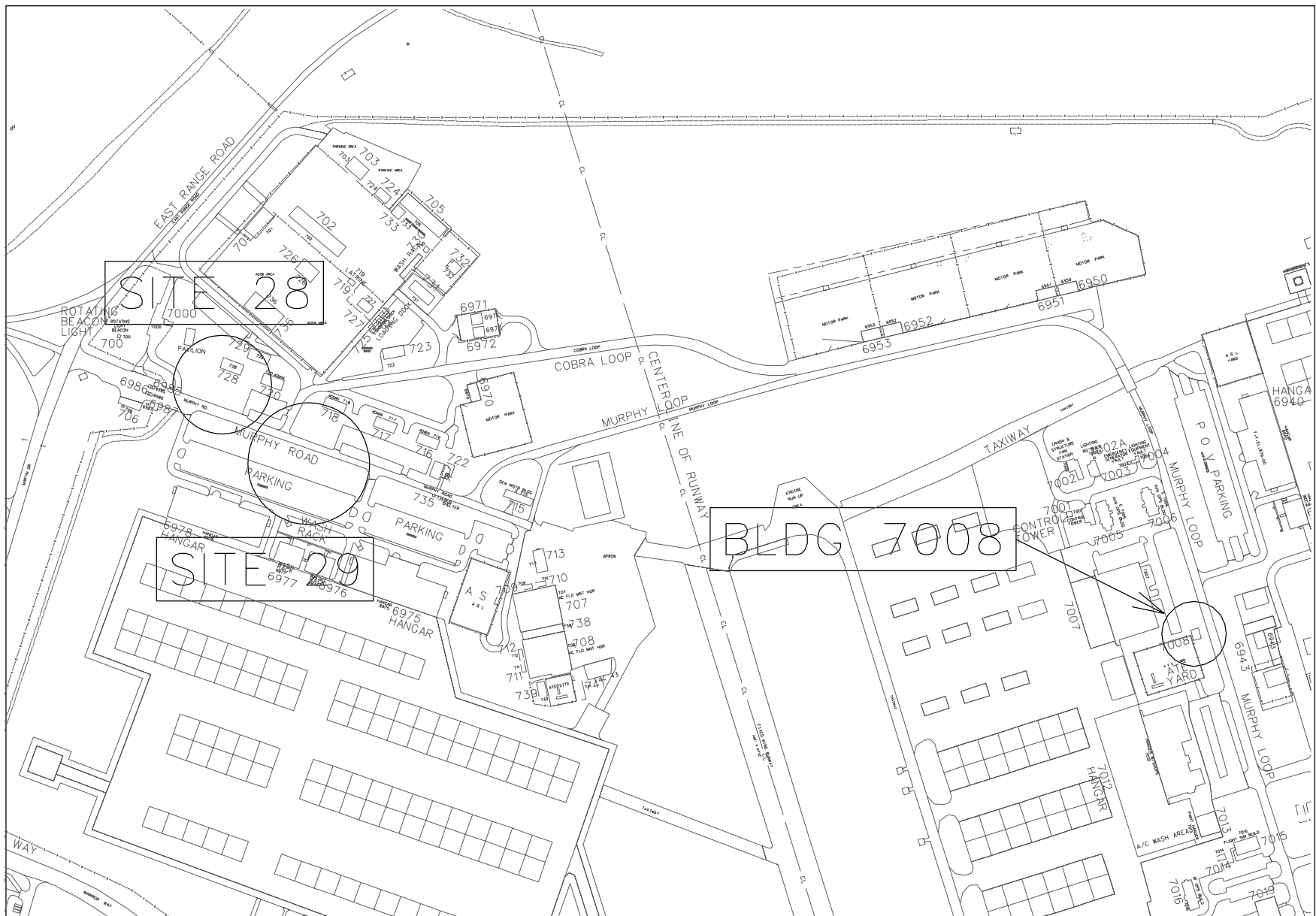


PIPE GUARD DETAIL

N.T.S.

NOTES TO DESIGNER:

PAINTING REQUIREMENTS, INCLUDING
COLOR AND STRIPING, SHOULD BE
COORDINATED WITH USER.



ATTACHMENT 29E
COMMUNICATIONS
SITES 28 & 29 (HAAF-700 BLK)

K6 CLASSROOM

1. ARCHITECTURAL

1.1 DESIGN CRITERIA [AM #0004]

1.1.1 Handicapped Access

The Classroom Facility shall be handicapped accessible. Ramps and sidewalks shall be provided for handicapped access to the Classroom Facility. The number of parking spaces and site access for the physically disabled shall be two spaces per facility. One parking space shall be van accessible.

1.1.2 Signage

Provide exterior signage in accordance with paragraph Exterior Signage and interior signage in accordance with paragraph INTERIOR DESIGN/Signage Requirements. Provide a building number sign.

1.1.3 Slabs on Grade

All interior slabs on grade, including storage rooms, shall be underlain by a moisture vapor barrier consisting of lapped polyethylene sheeting having a minimum thickness of 6 mils and a minimum 4 inches thick capillary water barrier of open graded, washed pea gravel, or crushed stone. Concrete slabs shall be jointed around columns and along supported walls to minimize cracking due to possible differential movement.

1.2 SITE DESIGN REQUIREMENTS [AM #0004]

See site development paragraphs such as SITE DESIGN AND CONSTRUCTION, UTILITY LAYOUT AND DESIGN, STORM DRAINAGE, WATER DISTRIBUTION, SANITARY SEWER, GAS DISTRIBUTION, and SITE GRADING.

1.3 ARCHITECTURAL DESIGN REQUIREMENTS [AM #0004]

1.3.1 General

The facility shall be a one-story permanent building on pre-engineered structural frame that meet the functional requirements specified below. Creative solutions that minimize delivery time are encouraged.

1.3.2 Functional Layout

Provide one 4,500 SF Classroom Facility. Functional requirements for this facility type are:

- Vestibule 50 SF. Provide resilient flooring.
- Lobby 125 SF. Provide one fire extinguisher in a flush mounted wall cabinet. Provide resilient flooring.
- Training Storage Area 300 SF. Provide resilient flooring. Storage for 140 extra folding chairs.

- **Classrooms** 2 @ 1500 SF ea. 100 students ea. Provide student chairs with cushions and folding writing surfaces. Provide Dry-Erase whiteboards and a manual projector screen. Provide a folding partition between the classrooms so they may be converted into one large classroom. Provide two fire extinguishers in flush mounted wall cabinets (one by each exit door). Provide carpet tile flooring.
- **Restrooms** 2 @ 200 SF ea. Provide ADA compliant restrooms for males and females. Male restrooms shall include 2 lavatories, 2 urinals, and 2 toilets. Female restrooms shall include 3 lavatories, and three toilets. Provide ceramic tile flooring with drains in each restroom.
- **Janitor's Closet** 15 SF. Constructed from noncombustible materials, and positive latching on door. Provide ceramic tile flooring with floor drain.
- **Communications Closet** 80 SF. Secure communications closet for equipment and panel board. Conditioned space with cipher lock at door. See electrical requirements. Provide sealed concrete slab.
- **Electrical** Room 100 SF. Constructed from noncombustible materials, one hour fire rating in walls, and door to exterior. Provide sealed concrete slab.
- **Mechanical Room** 200 SF. Constructed from noncombustible materials, one hour fire rating in walls, and door to exterior. Provide sealed concrete slab with floor drain.

These requirements are the minimum. Areas indicated are net square feet, and may be exceeded.

Arrange spaces in an efficient manner with simple circulation.

All facilities shall include stairs or ramps and entry landings at all entrances to meet applicable codes. All janitor closets shall have mop sink, mop rack, 6 lf of storage shelving and floor space for storage of janitorial equipment. Except where noted otherwise, all facilities shall have mechanical and electrical spaces to accommodate required equipment with space for maintenance/repair access without having to remove other equipment. See electrical requirements for communications room/SIPRNET communication room requirements.

1.3.3 Room Sizes See Section 01010.

1.3.4 Finishes

1.3.4.1 Interior Finishes See Section 01010.

1.3.4.2 Exterior Finishes

The following exterior finishes are approved for the Classroom Facility:

- Standing Seam Metal roof with fluoropolymer finish.
- Roof Drainage System (gutters, downspouts, flashing) with same type finish.
- Masonry Veneer designed in the context of nearby facilities/structures.

- Aluminum Windows & Doors with anodized finish.
- Steel Doors and frames with factory primed, site painted finish.

1.3.4.3 Masonry

- Where cavity wall CMU/brick construction is used, provide for damp proofing outside of the CMU.
- Provide masonry walls around mechanical rooms for sound insulation and fire protection.
- Provide masonry screen walls around mechanical yards for appearance and security. The screen wall shall be provided with a lockable gate.
- Provide a vapor barrier and insulation barrier around the insulated envelope of the building. Without a well constructed vapor barrier there is a tendency to create an environment for growing mold.

1.3.4.4 Standing Seam Metal Roof System

- Provide metal deck over roof structure with 3-1/2 inch or 4-1/2 inch zee purlins screw attached through the metal deck to the roof structure. The standing seam roof will be attached to the zee purlins. Rigid building insulation will be inserted below the zee purlins and is sandwiched between the metal deck and the standing seam metal roof (on large OMA or MCA projects). This system provides a firm surface for the DPW maintenance workers to walk on periodically. If frequent visits to the roof are anticipated, grated walkways may be attached directly to the standing seams with no roof penetrations. This system protects the building insulation from damage and from the effects of gravity/creep that has the tendency to pull exposed insulation down over a period of years.
- Provide minimum roof slopes of 2 on 12 rather than the historical 1 on 12. Experience shows that most roofs with a 1 on 12 roof slope ultimately have one or more flat spots created by construction tolerances, steel fabrication errors, and some installation problems. Low sloped roofs depend upon caulk to prevent leakage. For a 1 on 12 sloped roof, water will back uphill 12 inches for every 1 inch depth of water. Therefore, any overlap, roof penetration and exposed fastener is immersed in water.
- Provide full length standing seam roof sheets. We have had contractors ship panels up to 55 feet in length by truck to Fort Hood. We have had at least one contractor roll 150 feet long standing seam roof sheets on site. The one

piece roof sheets eliminate all end laps, thus reducing the potential roof leaks.

1.3.5 Doors And Windows

Windows will utilize 1-inch insulated units with 1/4-inch exterior laminated glass and 1/4-inch laminated interior glass. All exterior glazing shall be 3/4 inch laminated glass consisting of two 1/8" thick glass panes bonded together with a minimum 0.030-inch thick PVB interlayer. For insulating glass units, the inner pane shall be laminated glass as described above. Glazed door and window frames shall resist an equivalent static design load of 1 lb per square inch applied to surface of glazing and frame with frame deformation not exceeding 1/60 of the unsupported member lengths. Steel members may be designed using ultimate yield stresses and aluminum members may be designed based on a 0.2 percent offset yield strength. Glazing shall have a minimum frame bite of 1 inch. Door/window frame connections to building, hardware and associated connections and glazing stop connections shall resist equivalent static design load of 10.8 psi for glazing panels with vision area less than or equal to 10.8 square feet and 4.4 psi for glazing panels with vision area greater than 10.8 square feet and less than 32 square feet. Loads shall be applied to the surface of the glazing and the frame. Connections and hardware may be designed based on ultimate strength for steel and 0.2 percent offset yield strength for aluminum. All exterior doors must swing out. Exterior doors shall be insulated hollow metal. Exterior entry doors shall be SDI Level 3. Windows shall be energy efficient with double pane insulating glass units. Operable windows at administrative offices are preferred. All windows shall have mini-blinds. All operable windows shall have insect screens and locks.

1.3.6 Door Hardware See Section 01010.

1.3.7 Rainwater Management See Section 01010.

1.4 INTERIOR DESIGN See Section 01010. [AM #0004]

2. STRUCTURAL - SEE SECTION 01010

3. SPECIFIC PLUMBING DESIGN REQUIREMENTS

There are no specific plumbing requirements for this building other than the General Plumbing Design Requirements.

4. SPECIFIC HEATING, VENTILATING, AND AIR CONDITIONING REQUIREMENTS

Building is to be air conditioned.

Provide a separate air handler for each classroom with its own thermostat.

Provide Gas heating.

5. SPECIFIC FIRE PROTECTION REQUIREMENTS

Automatic fire sprinkler system is required for the classroom. Refer to Fire Protection Design for design requirements.

Fire Hydrants. Refer to Civil Design for design requirements.

Fire Extinguishers and Cabinets. Fire extinguishers are required. Refer to Architectural Design for design requirements.

Fire Alarm and Detection System. Fire alarm and detection system is required. Refer to Electrical Design for design requirements.

6. CLASSROOM INTERIOR ELECTRICAL DESIGN

In addition to receptacles specified in the general section, two outlets shall be provided in center of each classroom to provide for connection of a projector. Each classroom shall be provided with no fewer than four quadruplex receptacles for computers. Branch circuits serving computer receptacles shall be dedicated to computer receptacles. Each branch circuit shall supply a maximum of three computer receptacles. Branch circuits serving general-purpose receptacles shall be dedicated to general-purpose receptacles. Each branch circuit shall supply a maximum of six general-purpose receptacles. Branch circuits serving receptacles adjacent to CATV outlets shall be dedicated to these receptacles. Each branch circuit shall supply a maximum of four CATV receptacles. The location of computer receptacles and communication outlets shall be coordinated to assure a computer receptacle is provided adjacent to each communication outlet.

Provide TVSS on service entrance.

The communication system shall include a Local Area Network with duplex communications outlets throughout the building, with a communication duplex outlet provided alongside each computer receptacle, facsimile receptacle and common use printer receptacle.

Provide a CATV outlet in each classroom.

A Mass Notification System shall be provided.

A complete fire alarm system consisting of pull stations, detectors, flow and tamper switches, horns, visual indicators, control panel and fire alarm transmitter shall be provided.

Classroom lighting shall be equipped with dimmers to control each of the four sectionalized areas in each classroom.

K12 STORAGE BUILDING

1. ARCHITECTURAL

Minimum access drive width shall be 25 feet. Minimum turning radius shall be 15 feet except where fire truck access is required. The minimum turning radius for a fire truck shall be 55 feet.

1.1 DESIGN CRITERIA **[AM #0004]**

1.1.1 Handicapped Access

The Storage Facility will not be handicapped accessible.

1.1.2 SIGNAGE **[AM #0004]**

Provide exterior signage in accordance with paragraph Exterior Signage and interior signage in accordance with paragraph INTERIOR DESIGN/Signage Requirements. Provide a building number sign.

1.2 ARCHITECTURAL DESIGN REQUIREMENTS **[AM #0004]**

1.2.1 General

The storage facility shall be one-story permanent structure on pre-engineered structural frame that meets the functional requirements specified below. Creative solutions that minimize delivery time are encouraged.

Provide paved access at all entrances meeting applicable codes. See electrical requirements for communications requirements.

1.2.2 Functional Layout

Provide one 16,000 SF Storage Facility. Functional requirements for the facility type are described below. See diagrammatic floor plan attached to the end of this Section.

a. Large Storage Bays 7 @ 2,000 SF ea. Provide a pair of 4' x 8' doors (8' opening) at the ends of each storage bay. Provide a hook mounted fire extinguisher inside each set of doors. Bays are separated with pad lockable wire mesh partitions. The bottom of the roof trusses/structures are also secured with wire mesh to provide a barrier (12' minimum height). Subdivide the bays with wire mesh as per user requirements.

b. Small Storage Bays 2 @ 1,000 SF ea. Provide a pair of 4' x 8' doors (8' opening) for each storage bay. Provide a hook mounted fire extinguisher inside each set of doors. Bays are separated with pad lockable wire mesh partitions. The bottom of the roof trusses/structures are also secured with wire mesh to provide a barrier (12' minimum height). Subdivide the bays with wire mesh as per user requirements.

1.2.3 Room Sizes See Section 01010.

1.2.4 Finishes

1.2.4.1 Exterior Finishes

The following exterior finishes are approved for the Storage Facility:

- Metal Panel Roof with fluoropolymer finish.
- Roof drainage system (gutters, downspouts, flashing) with same type finish.
- Metal Panel siding with fluoropolymer finish.
- Aluminum Windows & Doors with anodized finish.
- Steel Doors and frames with factory primed, site painted finish.

1.2.4.2 Metal Siding

- Use steel channel side girts for a structural steel bldg that have added sag rods. Connect one and one-half zee to the steel channel by either welding or screws. Connect the siding to the zee.
- Install liner panels on the side walls of maintenance shops to protect the building insulation and to facilitate cleaning.
- The side girt spacing is critical for a metal building because the spacing determines the profile of the sidewall panel. A deeper profile will allow a wider spacing of the side girt. Consideration should be given to availability of the profile specified.
- Provide hidden fastener sidewall panels if possible.
- Provide a vapor barrier and insulation barrier around the insulated envelope of the building. Without a well constructed vapor barrier there is a tendency to create an environment for growing mold.

1.2.4.3 Doors

Exterior doors shall swing out. Exterior doors shall be insulated hollow metal. Exterior entry doors shall be SDI Level 3.

1.2.4.4 Door Hardware See Section 01010.

1.2.4.5 Rainwater Management See Section 01010.

1.2.5 Interior Design See Section 01010.

See SECTION 01010 for additional requirements.

2. STRUCTURAL - SEE SECTION 01010.

3. SPECIFIC PLUMBING DESIGN REQUIREMENTS - STORAGE FACILITY

There are no specific plumbing requirements for this building other than the General Plumbing Design Requirements.

4. SPECIFIC HEATING AND VENTILATING REQUIREMENTS - STORAGE FACILITY

Provide heating with low intensity gas infrared heaters.

Heat building to 40 degrees F. for freeze protection. Include capacity allowance for fresh air quantities in accordance with ASHRAE 62-2001 Ventilation Standards.

Provide exhaust fans. Indoor summer design temperature shall be 10 degrees F above the outdoor design temperature.

5. SPECIFIC FIRE PROTECTION REQUIREMENTS - Storage Facility

Automatic sprinkler protection shall be provided for Storage Facility as follows:

Supply/Storage Facility. Provide sprinkler protection per the requirements of UFC 3-600-01. Per UFC 3-600-01, 6-10.1 storage facilities must have complete automatic sprinkler protection. Sprinkler protection must be based on Class IV commodities as defined by NFPA 13. Refer to Fire Protection Design for additional design requirements.

Fire Hydrants. Refer to Civil Design for design requirements.

Fire Extinguishers and Cabinets. Fire Extinguishers are required. Refer to Architectural Design for design requirements.

Fire Alarm and Detection System. Fire Alarm and Detection System is required. Refer to Electrical Design for design requirements.

6. STORAGE INTERIOR ELECTRICAL DESIGN

A minimum of one general-purpose 120 volt, 20-ampere duplex receptacle outlet shall be provided on each wall. It is preferred to have receptacles centered on wall and accessible without having to go into a storage cage when cages are provided. In addition to the general-purpose receptacles, two quadraplex receptacles shall be provided for computers.

Interior lighting system shall be low bay pulse-start metal halide or linear T5 or T8 fluorescent luminaires designed specifically for bay or warehouse applications.

Provide TVSS on service entrance.

The communication system shall include a Local Area Network with duplex communications outlets throughout the building.

Photocell controlled wall mounted lighting shall be provided at the entrances to all secure unit storage buildings

A complete fire alarm system consisting of pull stations, detectors, flow and tamper switches, control panel and fire alarm transmitter shall be provided.



SOLICITATION NO. W9126G-04-R-0046
DATE: AUGUST 2004

US Army Corps
of Engineers
Fort Worth District

U.S. ARMY ENGINEER DISTRICT, FT. WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

FORT HOOD
TEXAS

REQUEST FOR PROPOSALS

FOR

DESIGN-BUILD MISCELLANEOUS
CONSTRUCTION, RENOVATION, & ALTERATION
PROJECTS AT FORT HOOD, TEXAS

VOLUME II

RENOVATION WORK
IN FOUR VOLUMES: IIA, IIB, IIC, IID

VOLUME IIA - DESIGN AND PERFORMANCE REQUIREMENTS

NOTE
THIS IS AN UNRESTRICTED SOLICITATION

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CHAPTER I

SUMMARY SCOPE OF PROPOSED RENOVATION WORK

Renovate forty-five (45) selective buildings of various size and condition to achieve greater efficiency of use and provide life safety code improvements.

Selective demolition of existing interior walls, door frames, doors (interior and exterior), windows (interior and exterior), partition assemblies, floor finishes, ceiling systems, localized mechanical and electrical systems, fire protection systems, roofing systems, and associated appurtenances. Abatement of asbestos-containing material, lead-based paints, molds, and other hazardous materials as indicated.

Renovation shall include selective installation of new interior walls, door frames, doors (interior and exterior), windows (interior and exterior), suspended and fixed ceiling systems, new floor coverings, new and upgraded lighting systems, plumbing and restroom improvements, modifications to existing mechanical, electrical, and communication systems, selective roofing repairs and replacement, interior painting, fire protection modifications and other miscellaneous improvements. Reconditioning of exterior roll-up doors, installation of vehicle exhaust venting systems, and other vehicle maintenance shop code improvements.

In addition to the renovation, this project involves all the furniture-related components necessary to complete the interior environment for the added user spaces and for five existing facilities that are not part of the forty-five selective buildings. The necessary components shall include loose furniture and furnishings in conformance with a Contractor prepared Comprehensive Interior Design (CID).

Approximate areas of renovation and limits of construction will be indicated on the amendment drawings.

The following is a list of buildings with an abbreviated proposed scope of improvements and rough estimate of proposed building renovation square foot areas:

<u>Buildings</u>	<u>Abbreviated Scope</u>
9410	Renovate into administrative area (approximately 4,000 SF)
9413	Renovate shop area into administrative area (approximately 4,800 SF)
9418, 9419, 9420, and 9421	Renovate first floor and basement into administrative and storage areas (approximately 14,800 SF each building)
9422, 9423, 9424, and 9425	Renovate first floor and basement into administrative and storage areas (approximately 14,800 SF each building)
9426 and 9427	Renovate administrative areas (approximately 2,600 SF each building)
10001, 10002, 10003, 10004, 10005, 10006, 10007, 10008, 10009, 10010, 10011, 10016, 10018, 10020, 10021, and 10022	Renovate first floor administrative areas (approximately 14,800 SF each building)
10033	Renovate administrative area into a server room (approximately 1,600 SF)
10040	Renovate classroom(s) into administrative areas (approximately 1,600 SF)
10045	Renovate administrative areas (approximately 3,800 SF)
12002	Renovate administrative and shop areas (approximately 12,900 SF)
12003, 12004, and 12008	Renovate first floor and basement into administrative and storage areas (approximately 15,800 SF each building)

12010 and 12019	Renovate administrative and shop areas (approximately 11,700 SF each building)
12020	Renovate administrative and shop areas (approximately 25,200 SF)
16010	Renovate administrative areas (approximately 11,700 SF)
87009	Renovate administrative areas (approximately 8,700 SF)
90038	Major interior demolition and renovation changing from an existing dining facility to administrative offices (approximately 7,500 SF)
4614	Renovate existing masonry shops into small office space (approximately 500 SF)
4615	Renovate vehicle maintenance facility (approximately 8,500 SF)
4616	Renovate vehicle maintenance facility (approximately 23,300 SF)
4617	Renovate maintenance facility (approximately 14,000 SF)

END OF CHAPTER I

CHAPTER II

FACILITY PERFORMANCE

PERFORMANCE

A. Basic Function:

1. Provide built elements and site modifications as required to fulfill needs described in the project program.
2. The complete project may comprise the following elements:
 - a. Substructure: Elements below grade and in contact with the ground.
 - b. Shell: The superstructure, exterior enclosure, and the roofing.
 - c. Interiors: Interior construction, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.
 - d. Services: Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.
 - e. Equipment and Furnishings: Fixed and movable elements operated or used by - occupants in the functioning of the project.
 - f. Sitework: Modifications to the site, site improvements, and utilities.
3. Code: Make all portions of the project comply with the code. The code referred to herein consists of all applicable local, State, and federal regulations, including but not limited to those listed below:
 - a. In the event of conflict and inconsistency between any of the provisions of the various codes, standards, or references, precedence shall be given in the following order:
 - 1) Contract requirements
 - a) The code, standard, or reference that is listed in the Contract design or performance requirement;
 - b) When conflict exists between references, the more stringent requirement shall govern;
 - c) Where a particular design aspect is not covered by any of the codes, standards, or references listed, nor by the requirements specified in the Contract, the Contractor shall be guided by other nationally recognized and accepted codes or standards which do apply;
 - d) The "authority having jurisdiction," as cited in codes, standards, or references, will be the Contracting Officer
 - 2) Installation Design Guide
 - 3) Southwestern Division's Architectural and Engineering Instructions Manual (AEIM)
 - 4) Technical and Engineering Manuals, Instructions, Letters, Design Guides, Engineer Regulations, Pamphlets, and Bulletins
 - b. Federal Regulatory Requirements:
 - 1) For Environmental Design, see additional federal regulation references in Chapter XII ENVIRONMENTAL DESIGN of SWD-AEIM.
 - 2) 29 CFR 1910-1997, Occupational Safety and Health Standards.

- 3) MIL-HDBK-1008C (10 June 1997) Fire Protection For Facilities Engineering, Design and Construction
 - 4) U.S. Environmental Protection Agency (EPA), National Pollution Discharge Elimination System (NPDES) Storm Water Construction Permit in accordance with Federal register, Volume 63, Number 128, July 6, 1998.
 - c. State of Texas regulatory requirements, Texas Commission on Environmental Quality (TCEQ)
 - 1) Air emission in accordance with 30 Texas Administrative Code (TAC) 116.111 and 30 TAC 106
 - d. Non-Regulatory Criteria Documents: In addition to specific regulatory requirements, the following documents are also incorporated into the definition of “the code” for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Government.
 - 1) NFPA 70-2002, National Electrical Code.
 - 2) NFPA 101-2000, Safety to Life From Fire in Buildings and Structures.
 - 3) ICC International Fire Code, 2000 edition.
 - 4) ICC International Building Code, 2000 edition.
 - 5) ICC International Plumbing Code, 2000 edition.
 - 6) ICC International Mechanical Code, 2000 edition.
 - 7) ICC International Fuel Gas Code, 2000 edition.
 - 8) Army Regulation (AR) 200-1, Environmental Protection and Enhancement, February 1997.
 4. Environmentally Responsible Design: In addition to other requirements, provide design and construction that minimizes adverse effects on the exterior environment, enhances the quality of the indoor environment, and minimizes consumption of energy, water, construction materials, and other resources.
- B. Amenity and Comfort:
1. Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the code and the following:
 - a. Summer Interior Design Conditions (Air Conditioned Core Areas):
 - 1) Daytime Setpoint: 78 deg F, plus or minus 2 deg F.
 - 2) Night Setback: 90 deg F.
 - 3) Interior Relative Humidity: 50 percent, maximum.
 - b. Summer Interior Design Conditions (Maintenance Bays and Warehouse):
 - 1) No comfort conditioning required. Natural ventilation through open bay doors and general mechanical ventilation for indoor air quality only will be provided.
 - c. Winter Interior Design Conditions (Core Areas):
 - 1) Daytime Setpoint: 72 deg F, plus or minus 2 deg F.
 - 2) Interior Relative Humidity: 30 percent, minimum.
 - d. Winter Interior Design Conditions (Maintenance Bays and Warehouse):

- 1) Daytime Setpoint: 55 deg F, plus or minus 2 deg F.
 - 2) Night Setback: 45 deg F.
 - e. Outside Air Design Conditions:
 - 1) Summer Outside Air Design Temperature: 0.4 percent cooling design condition listed in the 1997 ASHRAE Fundamentals Handbook.
 - 2) Winter Outside Air Design Temperature: 99.6 percent heating design condition listed in the 1997 ASHRAE Fundamentals Handbook.
 - f. Energy Design Wind Speed: 25 mph
- C. Health and Safety:
 - 1. Fire Resistance: Provide Type II-B construction in accordance with ICC International Code.
 - 2. Prevention of Accidental Injury: As required by code and as follows:
 - a. Safety Glazing: As defined by 16 CFR 1201; provide in locations required by code.
 - b. Other requirements specified in other Sections.
 - c. Substantiation:
 - 1) Preliminary Design: Identification of building elements that require special accident prevention measures.
 - 2) Design Development: Identification of safety measures taken, detailed description of design criteria, and structural analysis of load-resisting elements prepared by licensed structural engineer.
 - 3) Construction Documents: For load-resisting elements, structural design calculations and drawings sealed by licensed structural engineer.
 - 3. Health Hazards:
 - a. Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces.
 - b. Hazardous Construction Materials: Design and construct to comply with the requirements of the code and the following:
 - c. Indoor Air Quality: Design and construct to comply with the code and the following:
 - 1) Acceptable air quality as defined by ANSI/ASHRAE 62-1999.
 - 2) Substantiation:
 - a) Design Development: Identification of methods to be used to comply with requirements; ventilation design calculations. Identification of unusual indoor contaminants or sources and methods to mitigate their effects on occupants.
 - b) Construction Documents: Specifications showing that construction materials are not contaminant sources and do not adversely affect air quality.
 - c) Commissioning: Field measured outside and supply air quantities for each air handler.
 - d) Occupancy: Field testing to show compliance, after full occupancy.
 - 4. Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention

through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.

a. Security Zones:

- 1) Public Access Zone: That area to which the public has free access, including public corridors, grounds, and parking lots.
- 2) Reception Zone: The area to which the general public has access but beyond which access is restricted at all times.
- 3) Operations Zone: The area to which only employees, staff, or authorized personnel have access.
- 4) Secure Zone: The area to which access is always controlled and which is monitored continuously.
- 5) High-Security Zone: Areas indicated in project program and areas named “vault”, “secure file room”, and “cash room”.

b. See other Sections for additional requirements.

5. Electrically-Operated Equipment and Appliances: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.

6. Explosion Hazards: The following hazards will exist in the building:

- a. External Hazards: offspec fuel storage and waste oil storage.
- b. Internal Hazards: maintenance inspection pit.

D. Structure:

1. Earthquake Loads: Accommodate Maximum Considered Earthquake Ground Motion (MCE) of 0.2 s Spectral Response Acceleration (5% of Critical Damping), S_s, of 0.09 g, and Maximum Considered Earthquake Ground Motion (MCE) of 1.0 s Spectral Response Acceleration (5% of Critical Damping), S₁, of 0.05 g, and Soil Profile Type D; and otherwise in compliance with ANSI/ASCE 7-1998.

2. Substantiation:

- a. Preliminary Design: Detailed listing of design criteria and preliminary analysis, prepared by a licensed structural engineer.
- b. Construction Documents: Detailed design analysis by licensed structural engineer.

E. Durability:

1. Expected Service Life Span: Expected functional service life of the built portions of this project is 50 years.

- a. Service life spans of individual elements that differ from the overall project life span are defined in other Chapters.
- b. Additional requirements for elements not required to have life span equal to that of the project as a whole are specified below under “Operation and Maintenance”.
- c. Substantiation: Since actual service life cannot be proven, substantiation of actual service life is not required; however, the following are reasonable indicators of anticipatable service life:
 - 1) Design Development: Service life expectancy analysis, for each element for which life span is specified; including:
 - a) Length of effective service life, and aesthetic service life if specified,

- with action required at end; e.g. complete replacement, partial replacement, refurbishment.
 - b) Basis of time estimates; e.g. proven-in-use application.
 - c) Basis of confidence in time estimates; e.g. similarity of present application to proven-in-use application.
 - d) Conditions under which estimate will be valid; e.g. expected uses, inspection frequency, maintenance frequency, etc.
 - 2) Design Development: Replacement cost, in today's dollars, for each major element that has a service life expectancy less than that of the project; include both material and labor cost, but not overhead or profit; base costs on installing in existing building, not as a new installation.
 - 3) Design Development: Life cycle cost of project, over the specified project service life, excluding operating staff costs; include costs of:
 - a) Replacement of each element not expected to last the life of the project; identify the frequency of replacement.
 - b) Energy for operation of equipment and systems, from energy analysis specified under "Operation and Maintenance".
 - c) Routine maintenance of operating equipment, including replacement of worn parts before failure; identify frequency of maintenance.
 - d) Routine cleaning of exposed materials; identify type of cleaning and frequency.
 - e) Deduct salvage value of replaced elements.
 - f) Calculate costs in today's dollars, disregarding the time value of money, inflation, taxes, and insurance.
 - 2. Animals: Do not use materials that are attractive to or edible by animals or birds.
 - 3. Insects: Do not use materials that are edible by insects, unless access by insects is prevented.
- F. Operation and Maintenance:
- 1. Energy Efficiency: Minimize energy consumption while providing function, amenity, and comfort specified.
 - a. Provide energy efficient design using procedures and values specified in ASHRAE 90.1-1999.
 - 1) Provide at least 10 percent less energy consumption than that of an equivalent minimally-complying baseline building, demonstrated by comparing the actual Design Energy Cost to the Energy Cost Budget of a prototype building, both calculated in accordance with ASHRAE 90.1.
 - b. Substantiation:
 - 1) Design Development: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer.
 - 2) Design Development: Energy cost of all energy-consuming equipment and systems over the first year of operation; include analysis of probable change in annual cost over time due to aging but disregarding inflation and rate changes.
 - 3) Construction Documents: Detailed listing of design criteria and design analysis showing compliance, prepared by a licensed mechanical engineer.

2. Water Consumption: Minimize water consumption.
 - a. Substantiation:
 - 1) Design Development: Quantity of water that will be used in the first year of operation, divided into domestic water, HVAC water, and other water categories, with required storage capacity and quantity of water recycled, if any; include basis of calculations.
 - 2) Construction Documents: Updated water consumption, based on actual equipment selections and sizes.
3. Ease of Operation: Provide facility, equipment, and systems that are easily operated by personnel with a reasonable level of training for similar activities.
 - a. Minimize the need for specialized training in operation of specific equipment or systems; identify all equipment and systems for which the manufacturer recommends or provides training programs.
 - b. Substantiation:
 - 1) Design Development: Operating impact analysis, including identification of type and quantity of staff, tools, and supplies required; estimate of impact that aging materials will have on operating requirements; no cost calculations required; identify source of data.
 - 2) Construction Documents: Updated operating impact analysis, based on actual product selections.
4. Ease of Maintenance: Minimize the amount of maintenance required.
 - a. Substantiation:
 - 1) Design Development: Maintenance impact analysis, including identification of maintenance effort (type of staff, time required, and frequency), tools, and supplies required, over expected functional and aesthetic service life of project; including preventive maintenance, replacement of parts, and cleaning, but not energy for operation or replacement at end of service life; no cost calculations required; identify source of data.
 - 2) Design Development: Maintenance cost for first year of operation, based on use of maintenance contracts; estimate of the impact that aging materials will have on maintenance costs; description of maintenance activities included in estimated cost.
 - 3) Construction Documents: Updated maintenance impact analysis, based on final product selections.
 - 4) Construction Documents: Updated maintenance cost for first year of operation, based on actual product selections.
5. Ease of Repair: Elements that do not meet the specified requirements for ease of repair may be used, provided they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole; the service life expectancy analysis and life cycle cost substantiation specified for service life are provided; and Government' acceptance is granted.
6. Ease of Replacement:
 - a. Elements Not Required to have the Expected Service Life Span Equal to that Specified for the Project as a Whole: Make provisions for replacement without undue disruption of building operation.

ELEMENTS AND PRODUCTS

- A. In addition to requirements specified in other sections, provide products and elements that comply with the following.
- B. Elements Made Up of More Than One Product:
 - 1. Where an element is specified by performance criteria, use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
 - a. Proven-in-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as proposed and functioning as specified.
 - b. Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as proposed and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
 - c. The Contractor may choose whether to use elements proven-in-use or proven-by-mock-up, unless either option is indicated as specifically required.
 - d. Where test methods accompany performance requirements, use those test methods to test the mock-up.
 - e. Exception: Where a design analysis is specified, or allowed by the Government, substantiation of proven-in-use or proven-by-mock up construction is not required.
 - 2. Where a type of product is specified, without performance criteria specifically applicable to the element, use the type of product specified.
 - 3. Where more than one type of product is specified, without performance criteria specifically applicable to the element, use one of the types of products specified.
 - 4. Where a type of product is specified, with applicable performance criteria, use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
 - 5. Where more than one type of product is specified, with applicable performance criteria, use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
 - 6. Where neither types of products nor performance criteria are specified, use products that will perform well within the specified life span of the building.
- C. Products:
 - 1. Where a product is specified only by a manufacturer name and model number/brand name, use only that model/brand product.
 - 2. Where the properties of a product are specified by description and/or with performance criteria, use products that comply with the description and/or performance criteria.
 - 3. Where manufacturers are listed for a particular product, use a product made by one of those manufacturers that also complies with other requirements.
 - 4. Builders' Hardware:
 - a. All hardware, including hinges, closers, locksets, exit devices, door hold open devices, and door stops, shall be grade 1 in accordance with the Builders Hardware Manufacturers Association ANSI/BHMA Standards.

SUBSTANTIATION

- A. Definition: Substantiation is any form of evidence that is used to predict whether the design will comply with the requirements or to verify that the construction based on the design actually does comply. During Design Development and Construction Documents, requirements to submit substantiation are primarily intended to forestall use of designs or constructions that will not comply. At any time before completion of construction, substantiation is presumed to be only a prediction and may subsequently be invalidated by actual results.
1. Regardless of whether substantiation is specified or not, the actual construction must comply with the specified requirements and may, at the Government's discretion, be examined, inspected, or tested to determine compliance.
 2. Substantiation submittals will not be approved or accepted, except to the extent that they are part of documents required to be approved or accepted in order to proceed to the next stage of design or construction. However, approval or acceptance of substantiation will not constitute approval or acceptance of deviations from the specified requirements unless those deviations are specifically identified as such on the submittal. See Division 1 Sections 01012 DESIGN AFTER AWARD and 01330 SUBMITTAL PROCEDURES for definitions of "approved" and "accepted" submittals.
 3. The Government accepts the responsibility to review substantiation submittals in a timely manner and to respond if they are unacceptable.
- B. In addition to the requirements stated in other sections, provide the following substantiation of compliance at each stage of the project:
1. If a substantiation requirement is specified without an indication of when it is to be submitted, submit or execute it before the end of Construction Documents.
 2. See also Division 1 Sections 01012 DESIGN AFTER AWARD and 01330 SUBMITTAL PROCEDURES for submittal requirements.
- C. Previous Construction: Where elements proven-in-use are used to comply with performance requirements:
1. In the Proposal, identify which elements will be accomplished using proven-in-use elements.
 2. During Design Development, identify proven-in-use elements proposed for use, including building name, location, date of construction, owner contact, and description of design and materials in sufficient detail to enable reproduction in this project.
- D. Mock-Up Testing: Where elements proven-by-mock-up are used to comply with performance requirements:
1. In the Proposal, identify which elements will be accomplished using proven-by-mock-up elements.
 2. During Design Development, identify proven-by-mock-up elements proposed for use, with test report including date and location of test, name of testing agency, and description of test and mock-up.
 3. Mock-up testing need not have been performed specifically for this project, provided the mock-up is substantially similar in design and construction to the element proposed.
- E. Design Analyses (including Engineering Calculations):
1. Where a design analysis or calculation is specified without identifying a particular method, perform analysis in accordance with accepted engineering or scientific principles to show compliance with specified requirements, and submit report that includes analysis methods used and the name and qualifications of the designer.
 2. Where engineering design is allowed to be completed after commencement of construction, substantiation may be in the form of shop drawings or other data.
 3. Submit design analyses at the end of Design Development unless otherwise indicated.

4. Where design analysis is specified to be performed by licensed design professional, use a design professional licensed in the State in which the Project is located.
- F. Products:
1. Where actual brand name products are not identified by either the Government or the Contractor, identify the products to be used.
 2. During Design Development:
 - a. Where more than one product type is identified for a particular system, assembly, or element, identify exactly which type will be used.
 - b. For each product type, provide descriptive or performance specifications; early submittals may be brief specifications, but complete specifications are required prior to completion of construction documents.
 - c. For each product type, identify at least one manufacturer that will be used.
 - d. For major manufactured products that are commonly purchased by brand name, and any other products so indicated, provide manufacturer's product literature on at least one actual brand name product that meets the specifications, including performance data and sample warranty.
 3. During Construction:
 - a. Identify actual brand name products used for every product, except commodity products specified by performance or description.
 - b. Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
 - c. Provide manufacturer's product literature for each brand name product.
 - d. Provide the manufacturers certification that the product used on the project complies with the contract documents.
 - e. Builders' Hardware:
 - 1) **Hardware and Accessories:** Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Spare parts data for locksets, exit devices, closers, electric locks, electric strikes, electromagnetic closer holder release devices, and electric exit devices, after approval of the detail drawings. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.
 - 2) **Hardware Schedule:** Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information or catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; lock trim material thicknesses; lock trim material evaluation test results; corresponding reference standard type number or function number from manufacturers catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.
 - 3) **Keying:** Keying schedule developed in accordance with DHI Keying Systems, after the keying meeting with the user.
 - 4) **Certificates of Compliance:** The hardware manufacturers certificates of compliance stating that the supplied material or hardware item meets specified requirements. Each certificate shall be signed by an official authorized to certify in behalf of the product manufacturer and shall identify quantity and date or

dates of shipment or delivery to which the certificates apply. A statement that the proposed hardware items appear in BHMA L & R Directory, BHMA Closer Directory and SHMA Exit Devices Directory directories of certified products may be submitted in lieu of certificates.

- 5) **Buy American Act:** Furnish a separate certificate of compliance attesting that hardware items conform to the Section 00700 Contract clauses pertaining to the Buy American Act.
- f. Gypsum Board Products: Submit certification that gypsum board products, such as gypsum wallboard, gypsum backing board, cementitious backer units, and joint treating materials do not contain asbestos.
- 4. Before End of Closeout:
 - a. Provide copies of all manufacturer warranties that extend for more than one year after completion.

END OF CHAPTER II

CHAPTER III

SERVICES

PERFORMANCE

A. Basic Function:

1. Provide the following services:
 - a. Conveying Systems: Mechanized means of conveying goods, as specified in the project program.
 - b. Water and Drainage: Means of delivery of water to points of utilization, automatic heating and conditioning of domestic water; and unattended removal of water, rainwater, and liquid waste.
 - c. HVAC: Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.
 - d. Fire Protection: Automatic fire detection, suppression, and warning; automatic smoke control; and manual fire-fighting equipment.
 - e. Electrical Power: Energy to operate all electrically-operated devices, including those included under other services and those provided separately by the Government.
 - f. Artificial Lighting: Means of illuminating spaces and tasks, both interior and exterior, independent of reliance on natural light.
 - g. Telecommunications: Services that include voice and data transmission.
 - h. Process Utilities: Services that include air and gases.
 - i. Other Services: Services that include lightning protection, special grounding, cathodic protection, and public address/intercom system.
2. Utility Sources and Outlets:
 - a. Water Source: Ft. Hood, Water Distribution System.
 - b. Sewage Disposal: Connect building sewer to the existing public Sewage system.
 - c. Electrical Power Source: Electrical power is obtained from Texas Utilities Company with an electrical distribution sub-station located on post.
3. Where services elements must also function as elements defined within another element group, meet the requirements of both element groups.
4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter II - Facility Performance.

B. Amenity and Comfort:

1. Equipment Producing By-Product Heat: Ventilate housings and cabinets as required by equipment manufacturer and rooms and spaces as required to maintain specified environmental conditions.
2. Moisture: Prevent condensation from forming on service elements.
3. Airborne Sound:
 - a. Maintain the sound transmission characteristics of assemblies through which services must pass; comply with requirements of chapter where penetrated assembly is specified.
 - b. Prohibited Plumbing Noises: All sounds of flushing and of liquid running through pipes ("bathroom sounds") are prohibited outside of the rooms housing toilets, bathtubs, and showers, with the exception of when doors to those rooms are open.

- c. Equipment Noises: Noise level below that which will be objectionable, based on occupancy of spaces.
 - d. When services are located within assemblies that perform sound isolation functions, consider the noise produced by the service itself as one of the external sound sources.
 - 4. Structure-Borne Sound and Vibration: Prevent transmission of perceptible sound and vibration from services equipment that rotates, vibrates, or generates sound, by isolating such equipment from superstructure or by isolating equipment support foundations from building foundations.
 - 5. Cleanliness: Prevent accumulation of debris and dirt at floor mounted equipment, such as air handlers, chillers, pumps, switchgear, and panelboards by one or more of the following methods.
 - a. Provide 4-inch thick, concrete housekeeping pads.
 - 6. Odors: Eliminate, isolate, or exhaust odors produced by occupant functions and building services.
 - 7. Appearance:
 - a. Conceal services elements from view to greatest extent possible, with exposed portions of simple, neutral design and color.
 - 1) Exception: Standard designs of manufacturers, without consideration for appearance, may be used for fire suppression sprinkler heads.
 - 2) Where exposed portions are acceptable, do not obstruct or diminish clear dimensions of doorways, windows, other operable openings, access panels and cabinet doors, or passageways, stairs, and other exitways.
 - 3) Where exposed piping is acceptable, install it close to walls and overhead structure, parallel and square to finished construction, plumb and nominally horizontal (except where required to slope for drainage).
 - b. Cover annular spaces around pipes, ducts, and conduits, where they pass through walls, ceilings and floors, in visually exposed locations, with escutcheons or cover plates.
 - c. Mountings: On finished surfaces, use concealed attachments with cover plates, frames, or trim overlapping finishes.
- C. Health and Safety:
 - 1. Fire Safety:
 - a. Maintain fire resistance of walls, floors, ceilings, and other fire-rated assemblies that services must pass through, in accordance with requirements of the section in which the fire-rated assembly is specified.
 - b. Provide fire-rated separations between equipment rooms and other spaces where required, and as specified by, the code.
 - c. Combustible pipes may be used only where buried if outside building.
 - d. Substantiation for Combustible Materials, Where Allowed: UL listed or labeled, with flame spread and smoke develop ratings printed on product.
 - e. Provide products which are fire rated for the specific locations where they are installed.
 - 2. Safety Hazards: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.
 - 3. Excess Pressure: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.
 - 4. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.

5. Hazardous Contents:
 - a. Flammable liquid storage locations are in the POL storage.
 6. Electric Shock: Provide equipment which protects personnel from electrical shock.
 7. Toxic Materials:
 - a. Lead: Do not use lead or lead-containing materials in potable water systems.
 - b. Lead: In solid materials (including pipe), maximum lead content of 8 percent; in solders and flux, maximum lead content of 0.2 percent.
 8. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.
- D. Structure:
1. Supports for Piping, Conduit, Ducts, and Components: Attached to, and supported by, the superstructure, not to or by non-structural construction or sheet metal elements, so that they do not move or sag, using the following:
 - a. Supports that allow movement of the rigid linear elements (pipe, etc.) without undue stress on the piping, tubes, Mngs, components, or the superstructure.
 - b. Intermediate supports mounted between structural members to limit distance between supports.
 - c. Supports capable of handling seismic forces in accordance with the code.
 - d. Mounting frames, bases, or pads, designed for ease of anchorage or mounting.
 - e. Rigid sway bracing at changes in direction of more than one-half of a right-angle, for all pipes.
 - f. Substantiation:
 - 1) Design Development: Details of supports, including engineering analysis.
 2. Structural Design of Components and Their Supports: in accordance with code.
 - a. Safety Factor for Component Structural Elements: Two, based on mass (weight) of component.
 - b. Anchors: Securely and positively attach all services components to superstructure.
 3. Concealed or Buried Components: Design cover or concealment so that components are not subjected to damaging stresses due to applied loads.
- E. Durability:
1. Expected Service Life Span: Same as the service life of the building, except as follows:
 - a. Ducts, Piping, and Wiring in All Services: Same as the service life of the building.
 - b. All Components Permanently Installed Underground or Encased in Concrete: Same as service life of building.
 - c. Conveying Systems: Minimum 50 years.
 - d. Plumbing:
 - 1) Shut-Off Valves and Similar Components: Same as service life of building.
 - 2) Electrically- and Fuel-Operated Equipment: Minimum 20 years.
 - 3) Other Moving Components: Minimum 20 years.
 - 4) Plumbing Fixtures: Same as building service life.

- 5) Sink Faucets, But Not Other Fittings: Minimum 10 years.
- e. HVAC:
 - 1) Shut-Off Valves: Minimum 10 years.
 - 2) Dampers, Louvers, Registers, Grilles: Same as service life of building.
 - 3) Main Heat Generation and Cooling Equipment: Minimum 20 years.
 - 4) Secondary Equipment: Minimum 10 years.
 - 5) Control Components, Except Wiring: Minimum 10 years.
- f. Fire Protection:
 - 1) Sprinkler Heads, Valves, and Other Inlet and Outlet Components: Same as building service life.
 - 2) Pumps and Other Operating Components: Minimum 20 years.
 - 3) Fire Hoses: Minimum 20 years.
- g. Electrical:
 - 1) Power Distribution Equipment: Same as building service life.
 - 2) All Components of Life Safety-Related Systems: Minimum 20years.
 - 3) Control Components, Except Wiring: Minimum 10 years.
- h. Lighting Fixtures: Minimum 15 years.
- i. Telecommunications Systems: Minimum 10 years.
- j. Integrated Facility Controls: Minimum 15 years.
- k. Security Controls: Minimum 15 years.
- l. Lightning Protection and Special Grounding Systems: Same as building service life.
- m. Software and Firmware integral to Operation of Services Equipment: Minimum 20years functional life without reprogramming required.
2. Condensation: Provide insulated drain pans and piping to remove condensation from cooling coils.
3. Moisture Resistance: Where components are mounted to surfaces that are required to be moisture-resistant, seal mounting surface of components to finish surface so that moisture cannot penetrate under or behind component, using material that is not affected by presence of water, that is mildew-growth resistant, and that has a minimum service life of 10 years.
4. Temperature and Humidity Endurance: Design equipment to endure temperature and humidity that will be encountered and to resist damage due to thermal expansion and contraction.
5. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
 - a. Metals Considered Corrosion-Resistant: Aluminum, stainless steel, brass, bronze, cast iron, ductile iron, malleable iron, hot-dipped galvanized steel, chrome-plated steel, and cadmium-plated steel, and steel coated with high-build epoxy or coal tar-based paint.
 - b. Piping Connections for Piping of Dissimilar Metals: Dielectric adapters.
 - c. Underground Elements: Provide supplementary protection for underground metal pipes, ducts, and conduits, sufficient to prevent corrosion completely, for the service life of the element without maintenance.

- 1) 6 inches of concrete cover is considered to be permanent protection.
 - 2) Bituminous or other waterproof coating or wrapping is considered permanent protection unless cathodic protection is required and unless underground element is subject to movement due to structural loads or thermal expansion or contraction.
 - 3) Provide cathodic protection if any of the following is true; coatings or wrappings will not be considered sufficient protection for elements failing under these criteria:
 - a) Metal elements are submerged or buried in a soil environment known to cause corrosion on similar nearby structures.
 - b) Metal elements are submerged and buried in a soil environment in which stray DC electrical currents are present.
 - c) Metal piping carrying petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of piping.
 - d) Metal tank holding petroleum products or other hazardous or toxic materials is buried or otherwise installed without means of visual observation of entire exterior surface of tank.
 6. Accidental Water Leakage: Locate components that would be damaged by water leakage from pipes or through foundations or roof out of likely paths of water and at least 4 inches above floor level.
 7. Abuse Resistance:
 - a. Buried Components: Minimum of 12 inches below surface of ground.
 - b. Underground Piping and Conduit: Watertight and rootproof.
 - c. Finishes on Exposed Components Subject to Touching by Occupants: Durable enough to withstand regular scrubbing using ordinary methods.
 - d. Provide equipment which has been designed to prevent tampering.
 8. Accidental Damage: Protect equipment and piping from accidental damage.
- F. Operation and Maintenance:
1. Capacity:
 - a. Conveying Systems: As specified in the project program.
 - b. Water and Drainage: As required by code.
 - c. Heating, Cooling, and Ventilating: Maintain interior environment within ranges.
 - d. Fire Suppression: As required by code.
 - e. Electrical: As required by code.
 - f. Telecommunications: As specified.
 2. Efficiency:
 - a. Energy efficiency as specified.
 - b. Water consumption as specified.
 3. Ease of Use:
 - a. Provide software which is year 2000 compliant.

- b. Access: All mechanical and electrical equipment located to allow easy access. Provide access doors for equipment accessed through walls, partitions, or fixed ceilings.
 - c. Valves and Other Control Devices: Accessible handles, switches, control buttons; valve handles on top/upper side; chain or other remote operators where located out of normal reach above floor level.
 - d. Space Around Components: Working clearances and access routes as required by code and as recommended by component manufacturer.
 - e. Testing: After completion of installation, prepare services for starting-up by testing appropriately for proper operation.
 - f. Commissioning: Prepare services for use by eliminating operational anomalies, adjusting control systems for optimum operation, and demonstrating proper functioning.
 - g. Preparation for Operation: Provide assistance for the Government's preparations for operation as follows:
 - 1) Demonstration of all services to Government personnel.
 - 2) Training Government personnel in the operation of all service systems.
4. Ease of Cleaning: Where not otherwise specified, design equipment mountings to allow easy cleaning around, and under, equipment, if applicable, without crevices, cracks, and concealed spaces where dirt and grease can accumulate and with raised, closed bases for equipment mounted on the floor.
- a. Provide equipment with removable access panels to allow cleaning.
5. Ease of Maintenance and Repair:
- a. Piping Other Than Gravity Drains: Provide means of isolating convenient portions of piping system, so that small portions may be shut down leaving the remainder in operation and so that drainage of the entire system is not required to enable repair of a portion of it.
 - b. Piping: Entire systems drainable without disassembly of piping.
 - c. Above Ground Piping: Labeled to identify contents and direction of flow, each shut-off valve, each piece of equipment, each branch take off, and at 20 ft maximum spacing on exposed straight pipe runs.
 - d. Equipment in Piping Systems: Each unit provided with a union or flanged connect or at each pipe connection to allow easy removal.
6. Ease of Equipment Service: As specified in the following:
- a. Lighting: Adequate for locating and operating equipment; emergency lighting for critical components.
 - b. Do not locate any equipment requiring maintenance on the roof, in attics, in crawl spaces, where access must be through attics or crawl spaces, or where access is not possible using removable panels or doors.
 - c. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
 - d. Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
 - e. Parts: Readily available from stocking distributors within 50 miles of project location.

7. Maintenance Service: Maintain services as specified, including periodic inspections, routine maintenance recommended by manufacturers, and repair and replacement of defective elements; maintenance is required only for systems so specified.
8. Ease of Equipment Removal: Provide doors and corridors large enough for removal of major pieces of equipment, such as, chillers, and boilers.

PRODUCTS

- A. Do not use:
 1. CFC-based refrigerants.

METHODS OF CONSTRUCTION

- A. The following existing services elements must be removed to accomplish new construction:
 1. Existing asbestos and asbestos-containing insulation on pipes, ducts, and equipment.

END OF CHAPTER III

CHAPTER IV
ARCHITECTURAL

A. General Design Requirements:

1. Drawings provided are highly schematic and indicate only general arrangements for purposes of determining the project cost. Adjust these arrangements to meet user's requirements, accommodate required furnishings, and meet code requirements.
2. Design and construct to conform to the following codes:

UFC 3-600-01	<i>Design – Fire Protection Engineering for Facilities</i>
UFC 4-010-01	<i>DoD Minimum Antiterrorism Standards for Buildings (AT/FP)</i>
NFPA 101	<i>Life Safety Code</i>
NFPA 10	<i>Portable Fire Extinguishers</i>
IBC	<i>International Building Code</i>
3. Construct using non-combustible materials in accordance with IBC. As a minimum meet fire rating requirements for the existing construction type of each respective building.

B. Space Programming Requirements:

1. The following spaces are required for each Company facility. Recommended floor areas are listed for each space:

Administration Open Office	266 sf
XO	110 sf
1 SG	120 sf
CO CDR	150 sf
Training Room	100 sf
Meeting Room	375 sf
Platoon Office	574 sf
Storage	30 sf
A/V Closet	17 sf
Restrooms	73 sf
Supply	363 sf
NBC Storage	64 sf
Vault	400 sf

C. Finish Requirements:

1. Meet code requirements for combustibility and flame spread index for all materials. Provide the following typical finish systems, except where indicated otherwise on drawings:
 - a. Offices, Corridors, Meeting Rooms: Vinyl composition tile (VCT) floor; Resilient wall base (RB); Painted gypsum wall board (GWB) or painted concrete masonry unit (CMU) walls; Suspended acoustic tile ceiling (ACT).
 - b. Storage, Mechanical, Electrical, Communications, and Vehicle Maintenance Rooms: Clear sealed concrete (SC) floor; resilient wall base (RB); painted gypsum wall board (GWB) or painted concrete masonry unit (CMU) walls; painted existing structure ceiling.
 - c. Restrooms: Ceramic tile (CT) floor; Ceramic tile walls; Painted gypsum wall board ceiling (GWB).
- D. Building Envelope Thermal And Moisture Resistance Performance:
 1. Window and Glazing Systems: Provide a maximum U-factor 0.75 BTU/hr-ft²-F per NFC 100. Provide windows with a maximum solar heat gain coefficient 0.4 BTU/hr-ft²-F per NFRC 200. Comply with DOE Energy Star Window Program for Southern Climates. Provide windows with a minimum condensation index rating 85.
 2. Roof Systems: Repair known roof leaks. Replace indicated roofs. For new roofs, provide minimum average R-20 insulation.
 3. Exterior Wall Systems: Where providing new thermally conditioned spaces in existing buildings, insulate exterior walls to total minimum R-10 and provide vapor retarder. Place vapor retarder to prevent condensation of water vapor within wall system.

THE FOLLOWING INFORMATION IS PROVIDED AS A GENERAL GUIDE ONLY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFORM TO ALL DESIGN REQUIREMENTS OF THE RFP.

- E. Interiors:
 1. Provide appropriate finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specified occupancies.
 2. Interiors comprise the following assemblies:
 - a. Interior Construction: All elements necessary to subdivide and finish space enclosed within the shell, including applied interior surfaces of the exterior enclosure.
 - b. Interior Fixtures: All elements attached to interior construction that add functionality to enclosed spaces, except for elements classified as equipment or service fixtures.
 3. Provide physical separation between spaces, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions in each space.
 4. Provide finishes for interior surfaces that are appropriate for the functions of each space.
 5. Provide interior fixtures that are necessary for the proper functioning of each space.
 6. Where interior elements also must function as elements defined within another element group, meet requirements of both element groups.
 7. Provide interiors that are pleasing in appearance and do not detract from the primary functions performed in each space.
 8. Provide interiors that maintain ambient sound levels within primary spaces at levels recommended in ASHRAE HVAC Application Handbook, 2003, when adjacent spaces are occupied and are being used normally.
 9. Provide interior elements and surfaces that are textured appropriately for primary functions performed in each space.

10. Provide interior construction and fixtures to support without damage all loads required by code.
 - a. In addition to loads defined by code, provide for adequate support of wall-mounted or ceiling-mounted furnishings and equipment in spaces where such equipment is required by program or is likely to be installed after construction because of intended function.
 11. Provide interior construction and fixtures that are suitable in durability for the degree and type of traffic to be anticipated in each space.
- F. Interior Doors:
1. Equip all openings in partitions that function to allow passage of people, vehicles, and goods, so that openings can be closed and secured when not in use, using components as specified.
 2. The elements comprising interior doors include doors of all sizes and uses, gates, and elements that form or complete the openings, unless an integral part of another element.
 3. Where interior door elements also must function as elements defined within another element group, meet requirements of both element groups; interior doors function as partition elements when doors are closed.
 4. Protect door openings in fire-rated walls and partitions in accordance with the code.
 5. Emergency Egress: Where doors must be latched or locked, comply with all code requirements.
- G. Interior Windows:
1. Provide interior windows between adjacent spaces where required by the program or where proper functioning of adjacent spaces requires limited visual or physical connection between them.
 2. Where interior windows are integral with elements defined within another element group, meet requirements of both element groups. Fixed interior windows and operable interior windows, when closed, function as partition elements and cannot degrade performance of partitions below the levels specified.
- H. Stairs:
1. Provide interior stairs, ramps, and fire escapes as necessary for access to and egress from all occupied spaces required by the program, in compliance with all codes.
 2. Stairs comprise the following elements:
 - a. Structural supporting stairs, unless an integral part of superstructure.
 - b. Tread and riser construction, unless an integral part of the superstructure.
 - c. Railings for interior stairs.
 - d. Integral stair finishes.
 3. Where stairs are integral with elements defined within another element group, meet requirements of both element groups.
- I. Interior Finishes:
1. Provide appropriately finished interiors for all spaces by the program.
 2. Interior finishes comprise the following elements:
 - a. Wall finishes, including those applied to the interior face of exterior walls and to the vertical faces of superstructure elements.
 - b. Floor finishes, except for access floors.
 - c. Suspended ceilings and soffits.
 - d. Applied ceiling finishes.

- e. Stair finishes, except for integral stair surfaces.
 - f. Finishes applied to other interior surfaces.
 - 3. Where interior finishes are integral with elements defined within another element group, meet requirements of both element groups.
 - 4. Provide interior finishes that will not result in discomfort glare due to excessive contrast with light sources.
 - a. Ceiling Surfaces: Not less than 80 percent reflectivity, when measured in accordance with ASTM E 1477-1998a.
 - b. Wall Surfaces: Not less than 50 percent reflectivity.
 - c. Floor Surfaces: Not less than 30 percent reflectivity.
 - 5. For spaces subject to floor wetting, including entry lobbies, provide floor finishes with inherent slip resistance under wet conditions.
 - 6. At stairs and corridors, provide floor finishes with minimum static coefficient of friction of 0.60, measured in accordance with ASTM D 2047-1999.
 - 7. Wall Protection: In corridors, provide impact resistant corner guards or wall surfaces that are inherently resistant to impact damage.
 - 8. Flooring: Provide floor finishes that are appropriate for anticipated usage and traffic in each area, based on a 10-year replacement cycle.
- J. Identifying Devices:
 - 1. Provide identifying devices fixed to interior construction that is necessary for direction to and identification of functions and spaces as required by the program.
 - 2. Text/Content of Identifying Devices: Government will provide some content: Remainder to be provided by Contractor for Government's approval.
 - 3. Visibility:
 - a. Character Size: Provide signs with characters of adequate size to be seen comfortably by normally sighted persons at typical viewing distances.
 - b. Contrast: Provide signs with contrast between characters and background of not less than 70 percent.
 - 4. Convenience:
 - a. Room Label Signs: Provide signs with feature allowing Government to change information.
 - 5. Appearance:
 - a. Provide signage for entire project (each building) that is consistent in design with other interior features, existing signage, and overall color scheme.
- K. Accessory Fixtures:
 - 1. Provide accessory fixtures as required to accomplish the design as required by code and as indicated in the project program.
 - a. Mirrors:
 - 1) One for each lavatory, unless otherwise indicated.
 - b. Waste receptacles:
 - 1) One for each paper towel dispenser.

- c. Holders and dispensers for toilet and lavatory supplies furnished by the Government:
 - 1) Toilet Paper: One dispenser per toilet.
 - 2) Towels: One dispenser per 3 lavatories.
 - 2. Where accessory fixture also must function as elements defined within another element group, meet the requirements of both element groups.
 - 3. Broken Glass Hazard: Provide only fully tempered float glass for glass in fixtures.
- L. Exterior Windows and Other Openings:
 - 1. Fill, cover, close, or otherwise protect all openings in the exterior walls (other than doors) so that the entire exterior enclosure functions as specified, using windows and other opening elements as specified, without using components that must be installed at changes of season.
 - 2. Elements comprising exterior windows and other openings include windows, fixed glazing other than glazed walls, ventilation openings, protection devices for openings, and elements that form or complete the openings, unless an integral part of another element.
 - 3. Where exterior window and other opening elements also must function as elements defined in another element group, meet requirements of both element groups.
 - 4. Thermal Performance of Elements Forming Exterior/Interior Separation:
 - a. See Paragraph "Building Envelope Thermal and Moisture Resistance Performance."
 - 5. Air Infiltration:
 - a. Mechanical Ventilation Openings: Automatically closed when ventilation is not required. Unless ducted, maximum of 0.3 cfm/sq ft of crack when closed, measured in accordance with ASTM E 283-1991(R99) at differential pressure of 1.57 psf.
 - 6. Acoustical Performances:
 - a. Window Sound Transmission Class: Minimum 31 STC, as measured in accordance with ASTM E 90-1999 and classified in accordance with ASTM E 413-1987(R99).
 - 7. Appearance:
 - a. Sight Lines of Glazed Areas: Provide maximum glazing area with minimum interruption by framing elements.
 - b. Frames: Design frames of openings to give a flush appearance without shadow lines.
 - 8. Fire Resistance:
 - a. Rating as required to maintain fire resistance rating of exterior wall in which they occur.
 - 9. Wind Design:
 - a. No damage when tested in accordance with ASTM E 330-1997 at 1.5 times positive and negative design wind loads using 10 second duration of maximum load.
 - b. Members Supporting Glass: Maximum deflection of flexure limit of glass; with full recovery of glazing materials.
 - 10. Air Intake and Exhaust Openings: Minimize rainwater penetration and protect adjacent interior spaces from damage from water.
 - 11. Glazing:
 - a. Do not use ceramic glass.
 - b. All exterior window glazing shall be double glazed, exterior pane, 1/8 inch annealed float glass, interior pane shall be laminated, 2 ea. 1/8 inch annealed glass panes bonded

together with a bonding interlayer, such as 0.030 inch polyvinyl-butryal (PVB).

M. Exterior Doors:

1. Secure all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, so that the entire exterior enclosure functions as specified, using doors as specified, without using components that must be installed at change of season.
2. The elements comprising exterior doors include doors of all sizes and used, gates, and elements that form or complete the openings, unless an integral part of another element.
3. Where exterior door elements also must function as elements defined within another element group, meet requirements of both element groups.
4. Thermal Performance:
 - a. Maximum Thermal Transmittance of Any Individual Component: U-value of 0.30 Btu/sq ft/hr/deg F when tested in accordance with ASTM C 236-1989(R93).
5. Air Infiltration: Maximum of 0.20 cfm/ft of crack length, measured in accordance with ASTM E 283-1991 (R99) at differential pressure of 1.57 psf.
6. Acoustical Performance:
 - a. Sound Transmission Class: STC values as follows, when measured in accordance with ASTM E 90-1999 and classified in accordance with ASTM E 413-1987(R99).
 - 1) Main Entrance Doors: STC 33.
 - 2) Other Pedestrian Doors: STC 36.
 - 3) Service Doors: STC 36.
 - 4) Bay Doors: STC 26.
7. Transparency:
 - a. Provide pedestrian doors at building exits and exits from stairways to exterior with vision panels of at least 5 percent of door area.
8. Convenience and Accessibility:
 - a. Door Handles and Knobs: As required by code; where code and other requirements allow an option exit devices are preferred.
 - b. Mode of Operation: Self-closing, with manual hold-open, unless otherwise indicated.
 - c. Vehicle Maintenance Bay Doors: Recondition existing doors as required.
9. Fire Resistance:
 - a. Doors Required by Code to be Fire Resistive: Fire resistance rating as required by code, for fire resistance rating of exterior wall in which doors occur, tested in accordance with a method acceptable to local authorities.
10. Physical Security:
 - a. Doors non-removable from outside without use of key.
 - b. At locations not facing a street (no glazing).
 - c. Secure each exterior door using a "fail-secure" method that allows entrance plus exit from inside using only one motion.
 - 1) Keys: Type as required to minimize unauthorized entry.
 - d. Forced Entry: Provide doors capable of resisting forced entry equivalent to:

- 1) Swinging Doors: ASTM F 476-1984(R96) Grade 10.
 - 2) Sliding Doors: ASTM F 842-1997 Grade 10.
11. Door Louvers:
 - a. Louvers in metal doors shall be the same material as the doors.
 - b. Use fire rated louvers on fire rated doors.
12. Hardware for Swinging Doors:
 - a. Use satin, stainless steel finish.
 - b. Use fire rated hardware on fire rated doors.
 - c. Hinges: Ball-bearing butt hinges.
 - d. Exit Devices: Unless specifically indicated as one type, rim type or exposed vertical rod type.
 - e. Locksets: Unless specifically indicated as one type, bored (cylindrical).
 - f. Door Closers: Unless specifically indicated as one type, surface overhead frame-mounted type, surface overhead door-mounted type, concealed overhead frame-mounted type, or concealed overhead door-mounted type.
 - g. Door Stops: Unless specifically indicated as one type, floor-mounted type, wall-mounted type, or overhead door/frame mounted type.
 - h. Door Hold-Opens: Unless specifically indicated as one type, floor-mounted type, wall-mounted type, or overhead door/frame mounted type.

END OF CHAPTER IV

CHAPTER V

FURNITURE

GENERAL REQUIREMENTS

A. Furniture Layout:

1. Furniture layout shall be functional and coordinate with the building design and type of occupant to assure that locations of electrical and communication outlets, and lighting within the building are appropriate. The layout shall also be coordinated with other building features such as architectural elements, thermostats, lighting, etc. Furniture shall be located in front of windows only if the top of the item falls below the window.

B. Furniture Design (CID):

1. A Comprehensive Interior Design (CID) package shall be provided by the Design Build Contractor. The CID shall involve all furniture-related components necessary to complete the interior environment. The necessary components include all loose furniture and furnishings.
2. The CID presentation shall be submitted in 8 1/2" x 11" format in separate three inch ring binders with pockets on the inside of the covers. When there are numerous pages with thick samples, more than one binder should be used. Large D-ring binders are preferred to O-ring binders. Fold out items should have a maximum spread of 25 1/2".
3. Each sheet within the binder should be labeled with the project title, location, A-E firm name, and sheet number.
4. The following information must be included in the CID package:

a. Manufacturer's Summary List:

Manufacturer's Summary List is a list of all the manufacturers whose products are used in the CID package. For each manufacturer, provide the name, address, phone number, fax number and a point of contact.

b. Furniture Placement Plan:

A Furniture Placement Plan is a plan of one room showing each furniture component in the room. There shall be one Furniture Placement Plan for each room in the Composite Floor Plan that contains furniture. Furniture Placement Plans are drawn at 1/4" = 1' - 0" if possible, or at 1/8" = 1' - 0" if the room or area illustrated is very large. Each Furniture Placement Plan should include the following information:

- The job name, location, and date
- The footprint of the room
- The furnishings
- The room name and number
- A Furnishing Item Number for each furnishing item
- Quantity of each product specified for the CID

c. Furniture Illustration Sheet:

Provide one Furniture Illustration Sheet for each item of furniture in the CID. The Furniture Illustration Sheet should include all of the following information.

- The job name, location, and date
- A picture or line drawing of the product specified
- The furnishing item number which keys the product to the Composite Floor Plan and the Furniture Placement Plan
- The options specified, if any

- Specification data on the finishes and fabric
- Samples of the finishes and fabric
- A comprehensive list giving all occurrences of the item, broken down by room. For example:
 - 4 each Room 104 Commander
 - 2 each Room 103 Receptionist

d. Order Data Sheet:

The Order Data Sheets provide all information necessary to order the furnishings specified in the CID. Only one item should be listed per data sheet. The sheets should be in numerical order. The Order Data Sheet should include the following information:

- Furnishing item number.
- The job name, location, and date
- FSC Group, part, and section
- GSA Contract Number, Special Item Number (SIN), and contract expiration date
- Maximum Order Limitation
- Source and manufacturer's name (Include ordering address, telephone number & fax number)
- Product name
- Product model number or National Stock Number (NSN)
- Finish name and number
- Fabric name and number
- Dimensions
- Weight
- Description (Include construction information, fabric content, finish application, etc.)
- Justification (Example: "These guest chairs are coordinated to match the task seating at each workstation. The size of the guest chair is critical because of the limited space where they are to be placed. If this company is not selected, coordinate the newly proposed finishes with furniture item numbers #001, 002, 003.")
- Item location by room number
- Quantity per room
- Total quantity
- Unit price
- Total price
- Estimated freight charges, 7% of item cost (Note whether or not freight charges are included in the price of the CID item.)
- Special instructions (if any)

C. Furniture Specifications:

1. Materials shall be fire retardant to the maximum extent possible, and U.L. listings shall be met where applicable. User-friendly features shall be specified such as radius. Sharp edges and exposed connections are not acceptable. Clips, screws, and other construction elements shall be concealed wherever possible. Considerations shall be made to specify furniture with features that prevent damage from vacuum cleaners and maintenance products. A topical or inherent soil retardant treatment is required. Fabric upholstery shall be patterned to help hide soiling. Vinyl, Crypton or hard surface material shall be used in heavy use areas.
2. Task chairs shall be fully upholstered and have a 5-star caster base, with adjustable seat height, arm height, and back height.
3. Guest chairs shall be wood with an upholstered seat and back.
4. Pre-wired workstations shall be composed of panels, supporting components, electrical hardware and communications. The supporting components will consist of: horizontal plastic laminate

worksurfaces with a t-mold or waterfall edge; drawer pedestals with both box/box/file and file/file configurations; and overhead cabinets with task lighting. Panels shall be acoustic and tackable and shall be powered as required.

5. Casegoods such as desks, bridges, credenzas, returns, and files shall be constructed of solid wood with hardwood veneers.
6. Sled base stackable chairs shall have metal frames with upholstered seat and back. Upholstery shall be vinyl or Crypton.
7. Folding table shall have a plastic laminate top with vinyl edge and chrome folding legs.

FURNITURE FOR 4ID REALIGNMENT AND MISC. BUILDINGS

- A. See Page "Chapter V Page 4" for Buildings 9410, 9418, 9422, 9423, 9224-2, 9425, 9426/9427, 10005, 10008, 10016, 10022, 10045, and 90038.
- B. See Page "Chapter V Page 5" for Buildings 9419, 9421, 10009, 10018, 10020, and 10021.
- C. See Page "Chapter V Page 6" for Buildings 10001, 10003, 10006, and 10010.
- D. See Page "Chapter V Page 7" for Buildings 10002, 10004, 10007, and 10011.

FURNITURE FOR 33000 BLOCK

- A. See Page "Chapter V Page 8" for Buildings 33020 and 33026.
- B. See Page "Chapter V Page 9" for Buildings 33022 and 33024.
- C. See Page "Chapter V Page 10" for Buildings 33028, 33032, 33034, and 33036.

END OF CHAPTER V

4ID REALIGNMENT MISC BUILDINGS
COMPANY COMMAND FACILITY

BUILDINGS:(9410, 9418, 9422, 9423, 9224-2, 9425, 9426/9427, 10005, 10008, 10016, 10022, 10045, 90038)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals (14)
Cubicle	3	Mid-Back Task Chair	1	3	42
		Worksurface (60" x 24")	2	6	84
		Worksurface Corner (36" x 36")	1	3	42
		Storage, Accessories and Supports	1	3	42
		File Cabinets (BBF/FF)	2	6	84
		Panels (65" High)	7	21	294
Small Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	4	0	0
Common Offices	5	Single Pedestal Desk (72" x 24")	1	5	70
		Bridge (48" x 24")	1	5	70
		Credenza with Pedestal (72" x 24")	1	5	70
		Storage, Accessories and Supports	1	5	70
		Mid-Back Task Chair	1	5	70
		Upholstered Guest Chair	2	10	140
C.O. Offices	1	Wood Double Pedestal Desk (84" x 30")	1	1	14
		Wood Credenza with Lateral Files (84" x 24")	1	1	14
		Wood Hutch with Hinged Doors	1	1	14
		High-Back Task Chair	1	1	14
		Upholstered Wood Guest Chair	2	2	28
		Wood TV Cabinet	1	1	14
Admin Desks	1	Single Pedestal Desk (60" x 24")	1	1	14
		Return with Pedestal (60" x 24")	1	1	14
		Mid-Back Task Chair	1	1	14
Classroom	0	Sled Base/Stackable Chair	36	0	0
Meeting Room	3	Sled Base/Stackable Chair	12	36	504
		Folding Table (72" x 24")	6	18	252
Conference Room	1	Conference Chair	14	14	196
		Wood Conference Table	1	1	14
		Wood Credenza	1	1	14

4ID REALIGNMENT MISC BUILDINGS
BATTALION COMMAND
BUILDINGS:(9419, 9421, 10009, 10018, 10020, 10021)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals ()
Cubicle	5	Mid-Back Task Chair	1	5	30
		Worksurface (60" x 24")	2	10	60
		Worksurface Corner (36" x 36")	1	5	30
		Storage, Accessories and Supports	1	5	30
		File Cabinets (BBF/FF)	2	10	60
		Panels (65" High)	7	35	210
Small Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	4	0	0
Common Offices	9	Single Pedestal Desk (72" x 24")	1	9	54
		Bridge (48" x 24")	1	9	54
		Credenza with Pedestal (72" x 24")	1	9	54
		Storage, Accessories and Supports	1	9	54
		Mid-Back Task Chair	1	9	54
		Upholstered Guest Chair	2	18	108
C.O. Offices	1	Wood Double Pedestal Desk (84" x 30")	1	1	6
		Wood Credenza with Lateral Files (84" x 24")	1	1	6
		Wood Hutch with Hinged Doors	1	1	6
		High-Back Task Chair	1	1	6
		Upholstered Wood Guest Chair	2	2	12
		Wood TV Cabinet	1	1	6
Admin Desks	1	Single Pedestal Desk (60" x 24")	1	1	6
		Return with Pedestal (60" x 24")	1	1	6
		Mid-Back Task Chair	1	1	6
Classroom	0	Sled Base/Stackable Chair	36	0	0
Meeting Room	2	Sled Base/Stackable Chair	12	24	144
		Folding Table (72" x 24")	6	12	72
Conference Room	1	Conference Chair	14	14	84
		Wood Conference Table	1	1	6
		Wood Credenza	1	1	6

4ID REALIGNMENT MISC BUILDINGS
1/2 BATTALION - SUPPORT
BUILDINGS:(10001, 10003, 10006, 10010)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals (4)
Cubicle	6	Mid-Back Task Chair	1	6	24
		Worksurface (60" x 24")	2	12	48
		Worksurface Corner (36" x 36")	1	6	24
		Storage, Accessories and Supports	1	6	24
		File Cabinets (BBF/FF)	2	12	48
		Panels (65" High)	7	42	168
Small Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	4	0	0
Common Offices	5	Single Pedestal Desk (72" x 24")	1	5	20
		Bridge (48" x 24")	1	5	20
		Credenza with Pedestal (72" x 24")	1	5	20
		Storage, Accessories and Supports	1	5	20
		Mid-Back Task Chair	1	5	20
		Upholstered Guest Chair	2	10	40
C.O. Offices	0	Wood Double Pedestal Desk (84" x 30")	1	0	0
		Wood Credenza with Lateral Files (84" x 24")	1	0	0
		Wood Hutch with Hinged Doors	1	0	0
		High-Back Task Chair	1	0	0
		Upholstered Wood Guest Chair	2	0	0
		Wood TV Cabinet	1	0	0
Admin Desks	2	Single Pedestal Desk (60" x 24")	1	2	8
		Return with Pedestal (60" x 24")	1	2	8
		Mid-Back Task Chair	1	2	8
Classroom	0	Sled Base/Stackable Chair	36	0	0
Meeting Room	2	Sled Base/Stackable Chair	12	24	96
		Folding Table (72" x 24")	6	12	48
Conference Room	0	Conference Chair	14	0	0
		Wood Conference Table	1	0	0
		Wood Credenza	1	0	0

4ID REALIGNMENT MISC BUILDINGS
1/2 BATTALION - COMMAND
BUILDINGS:(10002, 10004, 10007, 10011)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typical (4)
Cubicle	4	Mid-Back Task Chair	1	4	16
		Worksurface (60" x 24")	2	8	32
		Worksurface Corner (36" x 36")	1	4	16
		Storage, Accessories and Supports	1	4	16
		File Cabinets (BBF/FF)	2	8	32
		Panels (65" High)	7	28	112
Small Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	4	0	0
Common Offices	4	Single Pedestal Desk (72" x 24"	1	4	16
		Bridge (48" x 24")	1	4	16
		Credenza with Pedestal (72" x 24")	1	4	16
		Storage, Accessories and Supports	1	4	16
		Mid-Back Task Chair	1	4	16
		Upholstered Guest Chair	2	8	32
C.O. Offices	4	Wood Double Pedestal Desk (84" x 30")	1	4	16
		Wood Credenza with Lateral Files (84" x 24")	1	4	16
		Wood Hutch with Hinged Doors	1	4	16
		High-Back Task Chair	1	4	16
		Upholstered Wood Guest Chair	2	8	32
		Wood TV Cabinet	1	4	16
Admin Desks	2	Single Pedestal Desk (60" x 24")	1	2	8
		Return with Pedestal (60" x 24")	1	2	8
		Mid-Back Task Chair	1	2	8
Classroom	0	Sled Base/Stackable Chair	36	0	0
Meeting Room	2	Sled Base/Stackable Chair	12	24	96
		Folding Table (72" x 24")	6	12	48
Conference Room	1	Conference Chair	14	14	56
		Wood Conference Table	1	1	4
		Wood Credenza	1	1	4

33000 BLOCK
BATTALION COMMAND BLDG
BUILDINGS:(33020 33026)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals (2)
Cubicle	24	Mid-Back Task Chair	1	24	48
		Worksurface (60" x 24")	2	48	96
		Worksurface Corner (36" x 36")	1	24	48
		Storage, Accessories and Supports	1	24	48
		File Cabinets (BBF/FF)	2	48	96
		Panels (65" High)	7	168	336
Small Cubicle	6	Mid-Back Task Chair	1	6	12
		Worksurface (60" x 24")	2	12	24
		Storage, Accessories and Supports	1	6	12
		File Cabinets (BBF/FF)	2	12	24
		Panels (65" High)	4	24	48
Common Offices	20	Single Pedestal Desk (72" x 24")	1	20	40
		Bridge (48" x 24")	1	20	40
		Credenza with Pedestal (72" x 24")	1	20	40
		Storage, Accessories and Supports	1	20	40
		Mid-Back Task Chair	1	20	40
		Upholstered Guest Chair	2	40	80
C.O. Offices	1	Wood Double Pedestal Desk (84" x 30")	1	1	2
		Wood Credenza with Lateral Files (84" x 24")	1	1	2
		Wood Hutch with Hinged Doors	1	1	2
		High-Back Task Chair	1	1	2
		Upholstered Wood Guest Chair	2	2	4
		Wood TV Cabinet	1	1	2
Admin Desks	4	Single Pedestal Desk (60" x 24")	1	4	8
		Return with Pedestal (60" x 24")	1	4	8
		Mid-Back Task Chair	1	4	8
Classroom	3	Sled Base/Stackable Chair	36	108	216 0
Resource Room	1	Sled Base/Stackable Chair	12	12	24
		Folding Table (72" x 24")	6	6	12
Conference Room	1	Conference Chair	14	14	28
		Wood Conference Table	1	1	2
		Wood Credenza	1	1	2

33000 BLOCK
BRIGADE HQ
BUILDINGS:(33022, 33024)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals (2)
Cubicle	12	Mid-Back Task Chair	1	12	24
		Worksurface (60" x 24")	2	24	48
		Worksurface Corner (36" x 36")	1	12	24
		Storage, Accessories and Supports	1	12	24
		File Cabinets (BBF/FF)	2	24	48
		Panels (65" High)	7	84	168
Small Cubicle	8	Mid-Back Task Chair	1	8	16
		Worksurface (60" x 24")	2	16	32
		Storage, Accessories and Supports	1	8	16
		File Cabinets (BBF/FF)	2	16	32
		Panels (65" High)	4	32	64
Common Offices	19	Single Pedestal Desk (72" x 24")	1	19	38
		Bridge (48" x 24")	1	19	38
		Credenza with Pedestal (72" x 24"	1	19	38
		Storage, Accessories and Support:	1	19	38
		Mid-Back Task Chair	1	19	38
		Upholstered Guest Chair	2	38	76
C.O. Offices	1	Wood Double Pedestal Desk (84" x 30	1	1	2
		Wood Credenza with Lateral Files (84	1	1	2
		Wood Hutch with Hinged Doors	1	1	2
		High-Back Task Chair	1	1	2
		Upholstered Wood Guest Chair	2	2	4
		Wood TV Cabinet	1	1	2
Admin Desks	4	Single Pedestal Desk (60" x 24")	1	4	8
		Return with Pedestal (60" x 24")	1	4	8
		Mid-Back Task Chair	1	4	8
Classroom	0	Sled Base/Stackable Chair	36	0	0
Resource Room	0	Sled Base/Stackable Chair	12	0	0
		Folding Table (72" x 24")	6	0	0
Conference Room	1	Conference Chair	14	14	28
		Wood Conference Table	1	1	2
		Wood Credenza	1	1	2

33000 BLOCK
COMMAND AND CONTROL FACILITY
BUILDINGS:(33028, 33030, 33032, 33034, 33036)

Room Type	Room Types per Building	Furniture Type	Quantity (each) per room	Quantity per Building	Total Quantity for Building Typicals (6)
Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		Worksurface Corner (36" x 36")	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	7	0	0
Small Cubicle	0	Mid-Back Task Chair	1	0	0
		Worksurface (60" x 24")	2	0	0
		Storage, Accessories and Supports	1	0	0
		File Cabinets (BBF/FF)	2	0	0
		Panels (65" High)	4	0	0
Common Offices	5	Single Pedestal Desk (72" x 24")	1	5	30
		Bridge (48" x 24")	1	5	30
		Credenza with Pedestal (72" x 24")	1	5	30
		Storage, Accessories and Supports	1	5	30
		Mid-Back Task Chair	1	5	30
		Upholstered Guest Chair	2	10	60
C.O. Offices	1	Wood Double Pedestal Desk (84" x 30")	1	1	6
		Wood Credenza with Lateral Files (84" x 24")	1	1	6
		Wood Hutch with Hinged Doors	1	1	6
		High-Back Task Chair	1	1	6
		Upholstered Wood Guest Chair	2	2	12
		Wood TV Cabinet	1	1	6
Admin Desks	5	Single Pedestal Desk (60" x 24")	1	5	30
		Return with Pedestal (60" x 24")	1	5	30
		Mid-Back Task Chair	1	5	30
Classroom	0	Sled Base/Stackable Chair	36	0	0
Meeting Room	0	Sled Base/Stackable Chair	12	0	0
		Folding Table (72" x 24")	6	0	0
Conference Room	1	Conference Chair	14	14	84
		Wood Conference Table	1	1	6
		Wood Credenza	1	1	6

CHAPTER VI MECHANICAL

BUILDING SERVICES PIPING

- A. Information for Specific Systems:
 - 1. System Pressures: Indicated on drawings.
 - 2. Pipe and Fitting Applications: Indicated on drawings; materials specified in 15105.
 - 3. Valve Types and Applications: Indicated on drawings; general requirements specified in 15110.
 - 4. Specialties: Indicated on drawings; general requirements specified in 15120.
 - 5. Sections Where Other Requirements are Specified:
 - a. Water and Drainage.
 - b. Domestic Water.
 - c. Plumbing Fixtures.
 - d. Sanitary Waste.
 - e. HVAC – Heating, Ventilating, and Air Conditioning.
 - f. Energy Supply.
 - g. Heat Generation.
 - h. Refrigeration.
 - i. Air Distribution.
 - j. HVAC Control.
 - k. Fire Protection.
 - l. Fire Sprinkler and Extinguishing Systems.
 - m. Fire Detection and Alarm.
 - n. Fire Protection Specialties.
- B. Field Testing: Visually inspect connections for leaks at frequent intervals over entire duration of test.
 - 1. Domestic Water:
 - a. Air pressure test maintained at 25 psi above system operating pressure for minimum of 1 hour.
 - 2. Gravity Drainage Inside Building:
 - a. Water pressure test, by filling with water and maintaining minimum of 10 feet water head for 15 minutes.
 - b. Air pressure test, by maintaining minimum of 5 psi air pressure using air compressor for minimum of 15 minutes.
 - 3. Gravity Drainage Outside Building:
 - a. Water pressure test, before backfilling, by filling with water and maintaining minimum of 10 feet) water head until backfilling is complete.
 - 4. Pressure Drainage:
 - a. Water pressure test, before backfilling, by plugging pipe, filling with water, pumping into

pipe, and maintaining pressure of at least 5 psi higher than the sewage pump rating until backfilling is complete.

PIPES AND TUBES

- A. ABS Pipe: ASTM D 2661, ASTM D 2751, or ASTM F 628, with matching fittings and solvent welded joints.
- B. ABS/PVC Composite Pipe: ASTM D 2680-1995a, with matching fittings and solvent welded joints.
- C. Brass Pipe: ASTM B43-1998, chrome-plated, with chrome plated ANSI/ASME B16.23-1992 fittings and mechanical compression joints.
- D. Ductile Iron Pipe:
 - 1. Hub and Spigot: ASTM A 74-1998 extra heavy weight, with cast iron fittings and ASTM C 564-1997 neoprene gaskets or lead/oakum joint seals.
 - 2. Hubless: CISPI 301-1997, with cast iron fittings and CISPI 310-1997 neoprene gaskets and stainless steel clamp/shield assemblies.
- E. Concrete Pipe: With matching fittings and elastomeric gaskets.
 - 1. Non-Reinforced: ASTM C 14-1999 or ASTM C 14M-1 999, Class 1.
 - 2. Reinforced: ASTM C 76-2000 or ASTM C 76M-2000.
- F. Copper Pipe: ASTM B 42-1998, hard drawn, with ASME B 1 6.18-1984(R94) or ANSI/ASTM BI 6.22-1995 (Add.98) fittings and soldered joints, or ANSI/ASME B16.26-1988 fittings and flared joints.
- G. Copper Tube:
 - 1. Water Piping, Not Buried: ASTM B 88-1999 (ASTM B 88M- 1 999), hard drawn (H), Type M/C, UB, or K/A.
 - 2. Water Piping, Buried: ASTM B 88-1999 (ASTM B 88-1999), hard drawn (H), Type UB or KIA.
 - 3. Water Piping Fittings: ASME B16.18-1984 (R1994) or ANSI/ASME B16.22-1995 (Add.98) fittings and soldered joints.
 - 4. Water Piping Fittings: Cast iron coated fittings and grooved Mechanical couplings.
 - 5. Sanitary Sewer and Vent, Buried: ASTM B 88-1999 (ASTM B 88M-1999), hard drawn (H), Type UB or KIA, with ASME B16.18-1984 (R1994) or ANSI/ASME B16.22-1995 (Add.98) flings and soldered joints.
 - 6. Sanitary Sewer and Vent, Buried: ASTM B 306-1999, with ANSI/ASME B16.23-1992 or ANSI/ASME B 1 6.29-1994 fittings and soldered joints.
 - 7. Natural Gas: ASTM B 88-1999 (ASTM B 88M-1 999), hard drawn (H), Type UB or KIA, with ANSI/ASME B 1 6.26-1988 fittings and flared joints.
 - 8. Natural Gas: ASTM B 68-1999 (ASTM B 68M-1999), or ASTM B 75-1999 (ASTM B 75M-1999), H58 general purpose annealed, with ANSI/ASME B16.26-1988 fittings and flared joints.
 - 9. Natural Gas: ASTM B 280-1999, 060 soft annealed, with ANSI/ASME B16.26-1988 fittings and flared joints.
 - 10. All Other Applications: ASTM B 88-1999 (ASTM B 88M-1999), hard drawn (H), Type L/B or K/A.
- H. CPVC (Chlorinated Polyvinyl Chloride) Pipe: ASTM D 2846/D 2846M-1 999, ASTM F 441 /F 441 M-1 999, or ASTM F 442/F 442M-1 999, with matching fittings and solvent welded joints.
- I. Ductile Iron Pipe: Complying with ANSI/AWWA C151/A21.51-1996 (Rev).

1. Ductile Iron Fittings: Complying with ANSI/AWWA C110-1998.
 2. Ductile Iron Fittings: Complying with ANSI/AWWA C153/A21.53-1994.
 3. Rubber-Gasket Joints: Complying with ANSI/AWWA C111/A21.11-1995 (Rev).
 4. Cement Lining: Comply with ANSI/AWWA C104/A21.4-1995.
- J. Fiberglass Reinforced Pipe: ASTM D 3262-1996, with ASTM D 3840-1999 fittings and epoxy joints.
- K. Glass Pipe: ASTM C 1053-2000, with matching fittings and stainless steel compression couplings with tetra-fluoroethylene seal rings.
- L. PB (Polybutylene) Pipe:
1. Buried: ASTM D 2662- 1996a, ASTM D 3000- 1995a, or ASTM F 809/F 809M-1995, with copper or nylon fittings and mechanical joints with copper bands or stainless steel clamps.
 2. Not Buried: ASTM D 3309-1996a, with ASTM F 845-1996 fittings or copper fittings, with mechanical joints with copper compression rings.
- M. PB (Polybutylene) Tube: ASTM D 2666-1996a, with ASTM F 845-1996 fittings and mechanical joints with copper band or stainless steel clamps.
- N. PE (Polyethylene) Pipe:
1. Water Piping, Buried: ASTM D 2239-1999 or ASTM D 2447-1999 Schedule 40, with ASTM D 2609-2000 fittings and mechanical joints with stainless steel clamps.
 2. Natural Gas, Buried: ASTM D 2513-2000, SDR 11; with ASTM D 2683-1998 or ASTM D 251 3-2000 socket type fittings and fusion welded joints.
- O. PE/AL (Polyethylenelaluminum) Composite Pipe: ASTM F 1281-2001 Or ASTM F 1282-2001, with brass compression type fittings.
- P. Glass pipe and fittings, with gasketed compression couplings.
- Q. PP (Polypropylene) Pipe: Flame retardant polypropylene, with electric resistance fusion joints.
- R. PVC Pipe: Solvent welded joints, unless otherwise indicated.
1. Water Piping, Buried: ANSI/AWWA C900-1997.
 2. Water Piping, Not Buried: ASTM D 1785-1999 or ASTM D 2241-2000, with ASTM D 2665-2000 PVC fittings.
 3. Sanitary Sewer and Vent, Buried: ASTM D 3034-2000 or ASTM D 2665-2000; ASTM D 3034-1998 may have push-on gasketed joints; large diameter: ASTM F 679 -2001 with push on gasketed joints.
 4. Sanitary Sewer and Vent, Not Buried: ASTM D 2729-1996a or ASTM D 2665-2000, with PVC fittings.
 5. Sanitary Sewer and Vent, Not Buried: ASTM D1 785-1999 Schedule 40 or ASTM D 2241-2000 SDR26 for 180 psi, with PVC fittings of same pressure rating.
 6. Rain Water Drainage: Same as for sanitary sewer. Steel Pipe:
- S. Steel Pipe:
1. Black Steel Pipe: ASTM A 53/A 53M-2000, Schedule 40, without galvanizing.
 2. Galvanized Steel Pipe: ASTM A 53/A 53M-2000, Schedule 40, galvanized, with cast iron fittings and grooved mechanical joints.
- T. Vitrified Clay Pipe: ASTM C 4-2000 or ASTM C 700-2000 standard strength, bell-and-spigot, with matching fittings and ASTM C 425-2000 compression joint devices.

VALVES

- A. Gate Valves:
 - 1. Class 125.
 - 2. 2 inches and Smaller: Bronze body, solid wedge; union bonnet and rising stem on threaded type; screwed bonnet and non-rising stem on solder type.
 - 3. 2-1/2 inches and Larger: Iron body mounted on bronze, bolted bonnet, rising stem, OS&Y, solid wedge, flanged ends.
 - 4. Cast Iron: MSS SP-70-1998.
 - 5. Bronze: MSS SP-80-1997.
- B. Globe Valves: Composition discs, rising stem, Class 150.
 - 1. 2 inches and Smaller: Bronze body; union bonnet on threaded type; screwed bonnet on solder type.
 - 2. 2-1/2 inches and Larger: Iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc, flanged ends.
 - 3. Stem Throttling: Composition disc valve with throttling nut.
 - 4. Metal Seated: Hardened stainless steel disc and seat ring.
 - 5. Cast Iron: MSS SP-85-1994.
 - 6. Bronze: MSS SP-80-1997.
- C. Ball Valves: Bronze two piece body, bronze stem, and Class 125; threaded or soldered ends; MSS SP-110-1996.
- D. Butterfly Valves: Conform to requirements of MSS SP-67-1995.
 - 1. Body Material: Cast iron.
 - 2. Body Style: Lug wafer.
 - 3. Disc Material: Ductile iron.
 - 4. Stem Material: Stainless steel.
 - 5. Seat Material: Buna N.
 - 6. Operator: Hand lever, 10 position.
- E. Drain Valves: Bronze body, screwed bonnet, rising stem, composition disc, 3/4 inch outlet connection, Class 125; threaded or solder ends.
- F. Pressure Reducing Valves: Bronze or iron body with diaphragm actuation; screwed ends for sizes 2-1/2 inches and smaller; flanged ends for sizes 3 inches and larger.
- G. Temperature and Pressure Relief Valves: Cast iron, bronze or steel body, stainless steel or bronze trim, direct spring loaded, lifting level, and ASME Unfired Pressure Vessel Code stamp.
 - 1. Relief Settings: As indicated on drawings.

PIPING SPECIALTIES

- A. Unions: Screwed type for pipes 2-1/2 inches and smaller; flanged type for pipes 3 inches and larger.
- B. Strainers: Iron body Y-type, with blowoff outlet, Class 125.

1. For Pipes 2-1/2 inches and Smaller: Screwed ends, perforated 20 mesh monel screen, machined screen seat and blowoff outlet.
 2. For Pipes Over 2 1/2 inches: Raised face flanged ends and perforated stainless steel screen with 1/16 inch perforations for pipe sizes 4 inches and smaller and 1 /8 inch for pipe sizes larger than 4 inches).
- C. Automatic Air Vents:
1. 150 psig or Less: Cast brass body with stainless steel float and valve pin; 3/4 inch inlet.
 2. 150 psig or Higher Semi-steel or cast iron body and bolted cover with stainless steel float, valve head and seat; 3/4 inch inlet, 1/2 inch outlet.
- D. Water Hammer Arrestors and Air Chambers: Stainless steel casing with flexible bellow, pressurized inert gas chamber; DI WH-201 Certified; precharged for operation in the temperature range and pressure intended.
- E. Cleanouts: Brass plugs with brass gasketed caps; for pipes up to 8 inches diameter same size as pipe, otherwise minimum of 4 inches.
1. At Walls in Finished Areas: Round stainless steel access cover secured with one screw.
 2. At Floors in Finished Areas: Square cover recessed to receive finish flooring.
- F. Air Gap Fittings: Cast bronze with threaded outlet.
- G. Traps: Self-scouring with no internal divisions; liquid seal of at least 2 inches but less than 4 inches; brass or bronze with chrome-plating where exposed to view.
- H. Floor Drains: Cast iron, ANSI/ASME A112.21.1 M-1 991 (R98).
1. Strainer: Round nickel-bronze flat grating, 2 times area of connecting pipe.
 2. Configuration as required to make watertight connection to waterproofing system or finish as applicable.
 3. Indirect Waste Drainage: Built-in funnel or anti-splash rim.
 4. Removable perforated sediment bucket.
 5. In Vehicle Traffic Areas: Extra heavy duty grating.
 6. Outdoor Areaway Drains: Similar to floor drains.
- I. Roof Drains: Bronze, ANSI/ASME A1 12.21.2M-1 991 (R98).
1. Strainer Removable polyethylene dome at least 4 inches high above roof level and 1-1/2 times area of connecting pipe.
 2. Configuration as required to make watertight connection to roofing system.

END OF SECTION

WATER AND DRAINAGE

PERFORMANCE

A. Basic Function:

1. Provide delivery of hot and cold domestic water to points of utilization and the removal of water, rainwater, and liquid waste.
2. Water and drainage elements comprise the following:
 - a. Plumbing Fixtures: All fixtures necessary for sanitation, occupancy, and use, that are connected to water supply or drainage; not including water heating or conditioning equipment or kitchen appliances.
 - b. Domestic Water: All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
 - c. Sanitary Waste: All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment.
 - d. Rain Water Drainage: All elements required for drainage of rain water from building areas in which it may accumulate and drainage of clear wastes from building services; not including gutters and downspouts or subdrainage.
3. Where plumbing elements also must function as elements defined within another element group, meet the requirements of both element groups.
4. In addition to the requirements of this chapter, comply with requirements specified in Chapter II – Facility Performance and Chapter III – Services.

B. Amenity and Comfort:

1. Hot Water Supply:
 - a. Provide pressure balanced shower valves which limit the water temperature to 110 deg F.
 - b. Set water heater at 120 deg F.
2. Noise:
 - a. Design to eliminate trapping air in piping systems.
 - b. Locate risers in dedicated and sound attenuated chases.
 - c. Minimize noise produced by fixtures.
3. Convenience:
 - a. Fixture Heights: As specified in code.
 - b. Fixture Configurations: As specified in code.
 - c. Water Connections: Hot water on the left side of fixtures and cold water on the right side of fixtures.
4. Odors:
 - a. Locate odor producing elements in areas separate from human occupancy in dedicated equipment rooms.
 - b. Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
 - c. Connect fixtures to prevent entry of sewer gases into occupied spaces.

C. Health and Safety:

1. Health: Provide potable water.
 - a. Public utility water can be considered to be potable.
2. Waste Disposal: Connect each fixture to sanitary drainage system for proper disposal of waste and harmful materials.
3. Pressure Control: Control pressures to protect the building, fixtures, equipment, and occupants from harm.
 - a. Maximum Water Distribution Working Pressure: 80 psi.
 - b. Pressure Reduction: Use pressure reducing valves or regulators.
4. Prevention of Sewer Gas Leaks:
 - a. Provide waste system vents as required by code to avoid trap siphonage or compression.
 - b. Prevent entry of sewer gases from the sanitary sewer into building's sewer system.
5. Protection of Potable Water Supply: As required by code. Provide backflow preventers on all services to building including Fire Protection System.
6. Waste Drainage: Provide drinking fountains and water coolers with indirect waste pipe for drainage.
7. Burn Hazards:
 - a. Maximum Fixture Discharge Temperature: 120 degrees F.
 - b. Maximum Exposed Surface Temperature: 105 degrees F.
8. Fire Hazards:
 - a. Do not use combustible piping materials inside the building.
 - 1) Terminate combustible piping entering the building within 5 feet of penetration.
9. Hazard Labeling: Clearly label domestic hot water, domestic cold water, rain water drainage, and sanitary waste and vent systems indicating the nature of contents and direction of flow.
 - a. Conform to requirements of ANSI/ASME 13.1-1996.
10. Hazardous Material Drainage: Prevent damage to public utility drainage systems by removing or neutralizing hazardous materials before discharging.

D. Structure:

1. Insulated Pipes: Prevent compression of insulation by using pipe shields or saddles or dense insulation inserts.

E. Durability:

1. Joint Durability: Provide watertight joints.
2. Electrical Component Protection:
 - a. Do not route piping through electrical rooms, switchgear rooms, and transformer vaults unless it is absolutely necessary.
 - 1) Where piping must be routed near electrical equipment, shield the electrical equipment with drip pans which drain to the nearest floor drain.
 - b. Substantiation: See tests specified under Operation and Maintenance.
3. Equipment Protection:

- a. Domestic Water Distribution System: Provide a filtration device upstream of equipment which may be damaged by debris in the distribution system.
- 4. Maximum Discharge Temperature into Sewer 120 degrees F.
- F. Operation and Maintenance:
 - 1. Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code.
 - a. Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level.
 - 1) Use booster pumps.
 - 2) Substantiation:
 - a. Design Development: Identification of pressure and flow requirements (design conditions) for the building; verification of source availability at design conditions.
 - b. Construction Documents: Equipment to be used to deliver water at design conditions; submit pump curves.
 - c. Construction: Test of system flow and pressure; submit report verifying performance.
 - b. Water Flow:
 - 1) Maximum Velocity: 8 fps at the design flow rate.
 - c. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of water supply source and flow conditions.
 - 2) Design Development: Piping design calculations and entrance locations.
 - 3) Construction: Prior to installation of plumbing fixtures and prior to concealment of piping, air and water tests of piping systems at 110 percent of operating pressure, maintaining pressure for 2 hours to demonstrate system is watertight.
 - 4) Construction: Functional tests of fixtures and equipment.
 - 5) Occupancy: Observation of function during full occupancy simulating extreme conditions.
 - 2. Waste Pipe Sizing:
 - a. Size piping as required by code.
 - b. Building Drain: 4 inches diameter, minimum.
 - c. Buried Piping Below Slabs: 3 inches diameter, minimum.
 - d. Pipes 3 inches in Diameter and Smaller: Sloped at 1:50 (1/4 inch per foot), minimum, downward in the direction of flow.
 - e. Pipes 4 inches in Diameter and Larger: Sloped at 1:100 (1/8 inch per foot), minimum, downward in the direction of flow.
 - f. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of sewer discharge method and locations.
 - 2) Design Development: Drainage design calculations and documentation of piping

- outlets.
- 3) Construction: Air and water pressure tests of piping systems; functional tests of drains and equipment under simulated full occupancy loads.
 - 4) Occupancy: Observation of function during full occupancy simulating extreme conditions.
- 3. Rain Water Drainage Capacity: As specified in the code and as follows:
 - a. Secondary Drainage: Required for roofs and exterior structural decks that do not drain naturally. Provide secondary roof drains connected to a secondary drainage system.
 - b. Substantiation:
 - 1) Preliminary Design: Analysis and documentation of rain water discharge methods and locations.
 - 2) Design Development: Drainage design calculations and documentation of piping outlets.
 - 3) Construction: Air pressure test to verify continuity of piping; functional tests of each drain.
 - 4) Occupancy: Field observation of performance during at least two storms.
- 4. Ease of Maintenance and Repair:
 - a. Isolation of Piping Segments and Equipment: Provide a means of isolating the following:
 - 1) Each building from main water service. Provide a shut-off valve located inside a valve box whose removable access cover is at grade level.
 - 2) Water meter from building piping.
 - 3) Each tenant space from building service, excluding locations where there is only one fixture with its own isolation valves.
 - 4) Each water branch from main service.
 - 5) Each vertical riser from piping below.
 - 6) Each water branch to fixtures or equipment from main vertical riser.
 - 7) Piping lower than the supply, to prevent unnecessary draining in the case of disconnection.
 - 8) Each plumbing fixture, storage tank, and item of equipment, so that removal of one will not necessitate shutdown of others.
 - 9) Individual fixtures and equipment. Provide an isolation device within 3 feet of pipe connection to item.
 - b. Provision for Drainage of Water Distribution Piping:
 - 1) Slope Piping Toward Drain: 1:500 (1/4 inch per 10 feet).
 - 2) Provide a system drain at the lowest point in the system.
 - 3) Provide an adequately sized drain for the volume of water inside the distribution system.
 - 4) Drain valve (or fixture shut-off valve) located at each low point.
 - c. Provision for Cleaning of Drainage Piping: Provide a cleanout as required by code and as follows:

- 1) At the upstream end of each horizontal sanitary drainage pipe, for cleaning in direction of flow.
- 2) At the dead end of each dead-end pipe.
- 3) At exit of sanitary drainage pipe from building provide two way cleanout.
- 4) Pipe 3 inches and Smaller: At intervals of 50 feet, maximum.
- 5) Pipe 4 inches to 6 inches: At intervals of 80 feet, maximum.
- 6) Pipe 8 inches and Larger: At intervals of 100 feet, maximum.
- 7) Clearance: As required by code to allow for cleaning and rodding of pipe.

METHODS OF CONSTRUCTION

A. Use the following practices and procedures:

1. Health: Maintain the safety of the potable water source at all times.
 - a. Do not connect the potable water source to any non-potable water source.
 - b. Keep animals and vermin out of open pipes, tanks, and other system components.
 - c. Keep other contaminants out of the distribution systems, equipment, and water source.
 - d. Do not connect private potable water source to public potable water source.

END OF SECTION

DOMESTIC WATER

PERFORMANCE

- A. Basic Function:
 - 1. Provide hot and cold domestic water to plumbing fixtures as required.
 - 2. Domestic water elements comprise the following:
 - a. Water Distribution: Piping within the building serving fixtures and equipment.
 - b. Plumbing Equipment: Pumps, tanks, filters.
 - c. Utility water supply fittings (hose bibs, wall hydrants) are specified.
 - 3. Where domestic water elements must also function as elements defined within another element group, meet requirements of both element groups.
 - 4. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter II - Facility Performance, Chapter III - Services, and Chapter VI - Mechanical.
- B. Amenity and Comfort:
 - 1. Location: Locate water heaters in mechanical room.
 - 2. Noise:
 - a. Design to prevent noise due to water hammer.
 - b. Provide water hammer arrestors as shown on drawings to eliminate noise produced by the domestic water fixtures.
- C. Health and Safety:
 - 1. Excess Pressure Hazard: Include devices to reduce accidental excess pressure to acceptable level, with maximum overpressure of 10 percent over specified system operating pressure, for the following items:
 - a. Water heaters.
 - b. Hot water recirculating pumps.
 - 2. Water Contaminants: Provide filtration device on water supply to drinking fountains and breakroom sinks.
- D. Durability:
 - 1. Shock Resistance: Do not use cast iron components where thermal or mechanical shock is expected.
 - 2. Moisture: Do not locate water heaters where leakage would cause damage to surrounding building materials, unless drip pans piped to floor drains are provided.
 - 3. Condensation: Provide insulation on cold water pipes, fittings, valves, and equipment to limit condensation.
 - 4. Temperature Changes: Provide method of allowing thermal expansion of domestic water in the hot water system.
- E. Operation and Maintenance:
 - 1. Pressure Classification: Provide pipe, pipe components, and equipment with a pressure classification of 125 psi.
 - 2. Energy Efficiency:

- a. Heat Loss: Provide insulation to limit heat loss of domestic hot water to a maximum of 2 degrees F in any 100 feet of pipe, when water is running, and maximum of 2 degrees F per hour, when water is standing.
 - b. Heat Loss: Provide recirculating pumps to limit the domestic hot water temperature drop to 2 degrees F within 100 feet of fixtures requiring domestic hot water.
 - c. Equipment Heat Loss: Provide insulation on the following equipment to limit domestic hot water heat loss to maximum of 2 deg F per hour, without energy input:
 - 1) Water softeners.
 - 2) Water heaters.
3. Method of Removing Air:
- a. Use one of the following:
 - 1) Automatic air vents.
 - 2) Manual air vents.
4. Water Heating Method:
- a. Use the following:
 - 1) Gas-fired water heaters.
5. Ease of Service and Maintenance:
- a. Fixture Shut-Off:
 - b. Equipment Isolation: Valves on both supply and discharge sides.

PRODUCTS

- A. Water Piping, Buried:
1. Use one of the following:
 - a. Copper pipe (ASTM B 42-1998), with brazed or-soldered cast copper or wrought copper or bronze fittings, or flared cast bronze fittings.
 - b. Ductile iron water pipe, cement lined, with ductile iron or gray iron fittings and gasketed joints.
- B. Water Piping, Not Buried:
1. Use the following:
 - a. Copper tube, cast copper, wrought copper, or bronze fittings, and soldered joints.
 - b. Galvanized steel pipe, galvanized fittings.
- C. Insulating Materials:
1. Use one of the following:
 - a. Mineral fiber.
 - b. Flexible cellular elastomeric.
- D. Valves for Shut-Off or Isolation of Equipment, Fixtures, and Parts of Systems:
1. Use one of the following:
 - a. Ball valves.
 - b. Gate valves.

- c. Butterfly valves.
 - d. Triple Duty valves (Isolation, Balancers, Check valves).
- E. Valves for Flow Control, Throttling, or Bypass:
 - 1. Use one of the following:
 - a. Ball valves.
 - b. Automatic flow control valves.
 - c. Manual calibrated flow control valves.
 - d. Triple duty valves (isolation, balancer, check valve).
 - e. Circuit setters.

END OF SECTION

PLUMBING FIXTURES

PERFORMANCE

- A. Basic Function:
 - 1. Provide plumbing fixtures necessary for occupancy, use, and sanitation.
 - 2. Fixtures Required: As specified by code.
 - a. Watercloset: In each restroom.
 - b. Urinals: In men's restroom.
 - c. Lavatories: At public and private restrooms and bathrooms.
 - 1) Group lavatories may be used wherever four (4) or more lavatories would be required in a single room; 18 inches of group lavatory perimeter qualifies as a substitute for one lavatory.
 - d. Service Utility Sink: One in each janitor's closet.
 - e. Showers: One in each indicated shower compartment.
 - f. Electric Water Cooler: Cooler number and locations per code.
 - g. Emergency Shower \ Eye Wash: One in each Repair Bay wing and as required by code.
 - 3. Where plumbing fixture elements must also function as elements defined within another element group, meet requirements of both element groups.
- B. Amenity and Comfort:
 - 1. Convenience:
 - a. Provide space between and around fixtures as required by code.
 - b. Faucets: Single action operation in all restrooms.
 - 2. Appearance:
 - a. Smooth, corrosion-resistant, non-absorbent, with no crevices to collect dirt.
 - b. Aesthetically pleasing and easy and comfortable to use; high style appearance is very important.
 - c. Color: White, except where metal fixtures are required.
- C. Health and Safety:
 - 1. Disease and Infection:
 - a. All openings and edges around the sides and bottom of each fixture permanently sealed with waterproof material.
- D. Structure:
 - 1. Anchor fixtures to support weight of fixtures and a minimum of 400 pounds without failure or stress on the connecting pipes.
 - 2. Wall Mounted Fixtures: Carriers concealed inside fixture and in wall or floor.
- E. Durability:
 - 1. Expected Service Life Span of Faucet Valves: 20 years.
 - 2. Expected Service Life Span of Flushing Mechanisms: 20 years.
 - 3. Water Resistance: Provide fixtures, trim and accessories that are resistant to corrosion, breakage,

scratching, burning, fading, and chipping due to continual contact with water, human usage, and cleaning with abrasive materials.

F. Operation and Maintenance:

1. Fixture Functions:
 - a. Lavatories: Standard spout, with integral overflow.
 - b. Urinals: Siphon jet flushing action.
 - c. Water Closets: Siphon jet flushing action.
 - d. Showers: With single-action hot-cold mixing valves.
 - e. Drinking Fountains: With hand operation, chilled water service.
 - f. Utility (Mop or Janitor's) Sinks: Filling of standard rolling mop bucket required: spout designed to support full bucket of water. Combination backflow preventer and vacuum breaker required in spout.
2. Water Pressure/Flow at Fixtures: 8 psi minimum, except otherwise required by code.
 - a. Showers: 20 psi minimum.
 - b. Flush Valves at Water Closets and Urinals: 20 psi minimum.
3. Water Consumption:
 - a. Water Closets: 1.6 gallons per flush, maximum, with complete waste removal in one flush.
 - b. Urinals: 1.0 gallons per flush, maximum, with complete waste removal in one flush.
 - c. Lavatory Faucets in Public Restrooms: 0.25 gallons per use.
 - d. Lavatory Faucets in Other Areas: 0.25 gallons per use.
 - e. Shower Heads: 2.5 gallons per minute, maximum.
 - f. Drinking Fountains: 2.5 gallons per minute.
4. Maintenance Service:
 - a. Electrically-Powered Fixtures: Battery-powered operation not allowed.
5. Ease of Cleaning:
 - a. Provide adequate access for cleaning each fixture and the areas around it.
6. Ease of Repair:
 - a. Each pipe connection to each fixture provided with a stop valve, for easy disconnection.
 - b. Provide access to all concealed connections, such as floor and wall cleanouts and slip-joint connections.

PRODUCTS

A. Water Closets:

1. Use one or more of the following:
 - a. External flush valve type.
 - a. Vitreous china.
 - b. Wall mounted fixtures.

B. Urinals:

1. Use one or more of the following:
 - a. Vitreous china.
 - b. Wall mounted fixtures.
- C. Lavatories:
 1. Use one or more of the following:
 - a. Vitreous china.
 - b. Ceramic, non-vitreous china.
 - c. Lavatory mounted fixtures.
 - d. Wall-hung fixtures.
- D. Emergency Shower / Eye Wash:
 1. Use one or more of the following:
 - a. Corrosion resisting steel.
 - b. Pedestal mounted.
- E. Showers:
 1. Use one or more of the following:
 - a. Precast terrazzo receptors.
 - b. Pressure-balancing mixing valves.
 - c. Wall mount.
- F. Faucets and Trim:
 1. Use one or more of the following:
 - a. Polished chrome-plated finish.
- G. Drinking Fountains:
 1. Use one or more of the following:
 - a. Electric water coolers.
 - b. Stainless steel finished units.
 - c. Surface wall mounted and/or floor mounted.
- H. Service Utility (Mop or Janitor's) Sinks:
 1. Use one or more of the following:
 - a. Precast terrazzo.
 - b. Corner Floor-mounted fixtures.
- I. Wash Fountain:
 1. Use one or more of the following:
 - a. Precast terrazzo.
 - b. Semi-circular fixtures.

END OF SECTION

SANITARY WASTE

PERFORMANCE

A. Basic Function:

1. Provide drainage for disposal of waste as required by the code and for the following: The complete project comprises the following elements:
 - a. Fixtures and equipment which have a waste connection or a domestic water connection.
 - 1) Waste connections are not required on icemakers, refrigerators with icemakers, exterior hose bibs, and coffee makers.
 - b. Emergency drainage: Floor drains located in:
 - 1) Basements.
 - 2) Rooms where waterproof membrane is specified or installed under floor finish.
 - c. Cleaning Drainage: Floor drains located as indicated in program.
 - 1) Hose-down areas.
 - 2) Breakroom.
 - d. Indirect Drainage: Floor drains to receive piping from:
 - 1) Equipment drain pans.
 - 2) Condensate drains.
 - 3) Other equipment that produces clear wastes.
 - 4) Other equipment specified to have indirect drain.
2. Where sanitary waste and vent elements must also function as elements defined within another element group, meet requirements of both element groups.
3. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter II – Facility Performance, Chapter III – Services, and Chapter VI – Mechanical.

B. Amenity and Comfort:

1. Convenience:
 - a. Do not locate floor drains and floor cleanouts in doorways or directly in traffic paths.
2. Odors:
 - a. Do not terminate vents within 10 feet horizontally of doors, windows, air intake or exhaust openings, or other openings in the exterior enclosure, unless vent termination is at least 3 feet above the top of the opening.
 - b. Do not locate vent openings under overhangs.
 - c. Do not locate vent openings closer than 10 feet to lot line.
 - d. Extend vent pipes at least 6 inches above the surface of roofs.
 - e. Extend vent pipes at least 12 inches above overflow level of the highest fixture served by the vent.
 - f. Provide an automatic means of priming traps which may evaporate enough water to break the trap seal allowing sewer gases to enter the building.

C. Health and Safety:

1. Flammable or Toxic Wastes: Provide means of safely disposing of:
 - a. Oil.
 - b. Anti-freeze (glycol solution).
 2. Disease and Infection:
 - a. Do not locate indirect drains in toilet rooms, unventilated or inaccessible rooms, or in air distribution or return plenums.
 - b. Provide a backflow prevention device in the sewer discharge to prevent back-up into plumbing fixtures and floor drains.
- D. Structure:
1. Hub-and-Spigot Joint Support: Support joints so they do not separate under weight of pipe or live loads.
- E. Durability:
1. Corrosion Resistance:
 - a. Where corrosive wastes can be neutralized or diluted below harmful levels, removal is not required, otherwise, provide appropriate interceptors to remove corrosive wastes, including solids.
 - b. Neutralizing Devices: Automatically operating, using water or neutralizing medium to render basic materials, acidic materials, and other chemical wastes harmless.
 - 1) Construct the drainage system upstream of the neutralizing devices using materials which are resistant to the specific corrosive elements entering the system.
 - 2) Corrosive agents entering the sanitary drainage system which must be neutralized or removed:
 - a) Hydrochloric acid.
 - b) Sulfuric acid.
 - c) Caustic solutions.
 - c. Oil Interceptors: Located as indicated in program.
 - d. Sediment Interceptors: Located at each floor drain where significant amount of sand is likely to be tracked in by occupants or blown in by wind.
 2. Condensation:
 - a. Prevent condensation from forming on or dripping from sanitary drain piping, floor drain bodies, drinking fountain or water cooler waste piping, condensate piping, and p-traps.
- F. Operation and Maintenance:
1. Maintenance of Drainage:
 - a. Where sewer discharge is higher than item to be drained, provide a means of lifting the waste for drainage.
 - 1) Method of Lifting Waste: Provide a grinder pump ejector or sewage pump and vented sump to lift waste to the sanitary sewer for drainage.
 - b. Fittings, Joints, and Offsets: As required to ensure optimal flow through horizontal and vertical piping and at changes of direction.
 - c. Transitions Between Horizontal Piping and Vertical Risers:

- 1) Sanitary Waste: Sanitary tees, wyes, or wyes and eighth bends.
 - 2) Vents: Wyes, wyes and eighth bends, and short radius fittings.
2. Ease of Cleaning:
 - a. Floor Drains: At low points in floor and flush with finish floor surface.
 - b. Cleanout Plugs: Flush with floor surface.
 - c. Drain equipment which produces or collects clear waste, such as condensation from cooling coils. Provide piping for the clear waste to the nearest floor drain.
 - d. Indirect Waste Pipes Over 1 inch Diameter: Provide a means to catch and remove solid materials 1/2 inch and larger, such as a strainer.
 - e. Oil Interceptors: Located as shown on drawings.
3. Minimization of Cleaning:
 - a. Grease Interceptors: Located at drains specifically intended for disposal of grease, as indicated in program.
 - b. Sediment Interceptors: Located at each floor drain where significant amount of sand is likely to be tracked in by occupants or blown in by wind.
4. Ease of Maintenance:
 - a. Interceptors That Must be Manually Cleaned:
 - 1) Designed for minimum of 2 months operation between cleanings.
 - 2) Located close to or in the same area as drains that receive the harmful wastes, for supervision and maintenance by occupants creating the waste.
 - 3) Removable waste container, with spare.

PRODUCTS

- A. Sanitary Waste and Vent Piping, Buried:
 1. Use the following:
 - a. Polyvinyl chloride (PVC) DWV pipe and fittings, with solvent welded or gasketed joints.
- B. Sanitary Waste and Vent Piping, Not Buried:
 1. Use the following:
 - a. Polyvinyl chloride (PVC) DWV pipe and fittings, with solvent welded joints.
- C. Chemical Resistant Sanitary Waste and Vent Piping:
 1. Use one or more of the following:
 - a. Acrylonitrile butadiene styrene (ABS) plastic pipe and fittings, with solvent welded joints.
 - b. Cast iron pipe, hubless, with neoprene gaskets and stainless steel clamps.
 - c. Polyvinyl chloride (PVC) DWV pipe and fittings, with solvent welded joints.
 - d. Glass pipe and fittings, with gasketed compression couplings.
 - e. Polypropylene pipe and fittings, with fusion welded joints.
- D. Cleanout Plugs:
 1. Use the following:

- a. Brass.
- E. Cleanout Caps:
 - 1. Use the following:
 - a. Brass.
- F. Floor Drains:
 - 1. Use one of the following:
 - a. Cast iron.
 - b. Copper.

END OF SECTION

HVAC – HEATING, VENTILATING, AND AIR CONDITIONING

PERFORMANCE

- A. Basic Function:
1. Provide artificial means of controlling temperature, relative humidity, velocity, and direction of air motion in the interior spaces enclosed by the shell, and reduction of airborne odors, particulates, and contaminant gases.
 2. The HVAC system consists of the following elements:
 - a. **Energy Supply:** Elements which provide energy used to maintain building comfort.
 - b. **Heat Generation:** Elements required to heat building to maintain space comfort.
 - c. **Refrigeration:** Elements necessary to generate the cooling requirements to maintain building comfort.
 - d. **Air Distribution:** Elements required to distribute air to maintain building comfort.
 - e. **HVAC Controls:** Elements required to control equipment which maintains building comfort.
 3. Where HVAC elements also must function as elements defined within another element group, meet the requirements of both element groups.
 4. In addition to the requirements of this chapter, comply with all applicable requirements of the Facility Performance Chapter and the Service Chapter.
- B. Amenity and Comfort:
1. Space Temperature Setpoint: As required in the Facility Performance Chapter.
- C. Health and Safety:
1. Outdoor Air Intakes: Locate all outside air intakes minimum of 10 feet above grade.
 2. Locate exterior HVAC equipment 33 feet from exterior wall of buildings, where required by Force Protection regulations.
 3. Standard Equipment Bracing: Design all overhead equipment mountings to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction. This standard does not preclude the need to design equipment mountings for forces required by other criteria.
 4. Electrical Shock Prevention:
 - a. Provide a means of disconnecting power at each piece of equipment.
 5. Refrigerants:
 - a. Comply with the requirements of ASHREA 15-1994.
 - b. Prevent release of refrigerant to atmosphere.
 - c. Prevent exposure of occupants to hazardous refrigerants.
 6. Indoor Air Quality: Provide sufficient ventilation to obtain acceptable indoor quality, determined using the Ventilation Rate Procedure of ANSI/ASHRAE 62-1999.
- D. Operation and Maintenance:

PRODUCTS

- A. HVAC System Type:

1. Use one or more of the following:
 - a. Stand-Alone HVAC Systems:
 - 1) Forced-draft, natural gas furnace with split-system cooling.
 - 2) Air-cooled, self-contained air handlers.
 - 3) Gas fired, vented, low intensity radiant tube heaters.
 - 4) Gas fired unit heaters.
 - 5) Gas fired heating-ventilating and make-up air units.
 - 6) Exhaust fans.
 - 7) Supply fans.
 - 8) Overhead vehicle tailpipe exhaust system.
 - 9) Condenser units.
 - 10) Gas fired and/or electric water heater.
 - b. Central HVAC Systems:
 - 1) Central chilled water and hot water heating systems with fan coil units and air handlers.
 - 2) Chilled water supplied by an air-cooled chiller.
 - 3) Window air conditioning units.

END OF SECTION

ENERGY SUPPLY

PERFORMANCE

- A. Basic Function:
 - 1. Provide natural gas for HVAC, plumbing, and process equipment as follows:
 - 2. Comply with ICC International Fuel Gas Code-2000.
 - 3. Where energy supply elements also function as elements defined within another element group, meet the requirements of both element groups.
 - 4. In addition to the requirements of this chapter, comply with all applicable requirements of the Facility Performance Chapter and the Service Chapter.
- B. Amenity and Comfort:
 - 1. Heating: Provide fuel to all fuel burning equipment that is used to maintain space comfort and water heating.
 - 2. Leakage:
 - a. Provide leak-free distribution system.
- C. Health and Safety:
 - 1. Natural Gas System Working Pressure: 5 psig, maximum.
- D. Structure:
 - 1. Seismic Protection:
 - a. Provide fuel distribution system with the ability to flex where differential movement is anticipated.
 - b. Provide fuel distribution supports capable of supporting twice its installed weight.
- E. Durability:
 - 1. Expected Service Life Span: Provide a system which will be viable for the life of building.
- F. Operation and Maintenance:
 - 1. System Capacity: Provide a fuel supply line (pipe) with capacity to serve the equipment plus 50 percent reserve capacity.
 - 2. Ease of Service:
 - a. Provide shut-off valves as required by code and at each branch connection.

PRODUCTS

- A. Pipe:
 - 1. Use one or more of the following:
 - a. Materials permitted by code.
 - b. Copper pipe with flared or brazed joints.
 - c. Stainless steel pipe with threaded joints.
 - d. Steel pipe with threaded or welded joints.
- B. Fittings:
 - 1. Use one or more of the following:

- a. Materials permitted by code.
- b. Copper.
- c. Aluminum-alloy.
- d. Ductile iron.
- e. Steel.

METHOD OF CONSTRUCTION

- A. Construct the system as required by code.

END OF SECTION

HEAT GENERATION

PERFORMANCE

- A. Basic Function:
 - 1. Provide the necessary equipment and infrastructure to deliver heat to the conditioned spaces.
 - 2. Where HVAC elements also must function as elements defined within another element group, meet the requirements of both element groups.
 - 3. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter II - Facility and Performance and Chapter III - Services.
- B. Health and Safety:
 - 1. Hazards: Provide boilers and furnaces which safeguard people, property and equipment from the following potential hazards:
 - a. Exposure to open flames.
 - b. Exposure to hot surfaces.
 - c. Exposure to carbon monoxide.
- C. Durability:
 - 1. Temperature Endurance: Provide equipment designed for ambient temperature ranging from minus 5 deg F to 122.
 - 2. Chimneys and Flues: Provide flues design for flue gas temperature of 400 deg F.
- D. Operation and Maintenance:
 - 1. Ease of Use: Design access to and working clearances around heating equipment as recommended by the manufacturer.

PRODUCTS

- A. Furnaces:
 - 1. Use the following:
 - a. Horizontal or vertical gas-fired furnaces.
- B. Flues:
 - 1. Use one or more of the following:
 - a. Double-walled; aluminum inner and galvanized outer Type B gas vents.
 - b. Double-walled; stainless steel inner and aluminum coated steel outer duct.
 - c. Double-walled; stainless steel inner and aluminum coated steel outer duct with 1 inch thick insulation between inner and outer walls.

END OF SECTION

REFRIGERATION

PERFORMANCE

- A. Basic Function:
 - 1. Provide the necessary equipment to generate the cooling required to maintain building comfort.
 - 2. Where refrigeration elements also function as elements defined within another element group, meet the requirements of both element groups.
 - 3. In addition to the requirements of this chapter, comply with all applicable requirements of the **Facility Performance** Chapter, **Service** Chapter and **Heating, Ventilating, and Air Conditioning** Chapter.
- B. Durability:
 - 1. Temperature Endurance: Provide equipment designed for temperatures ranging from minus 5 deg F to 122 deg F.
- C. Operations and Maintenance:
 - 1. Design Criteria: Design system in accordance with ASHRAE Fundamentals and Systems Handbooks and good engineering practice. Ambient design conditions shall be taken from the 0.4% column of ASHRAE Climatic design information except that air cooled equipment shall be selected based on ambient temperature of 105 deg F.
 - a. Condenser Fouling Factor: 0.0005 sq ft deg F hr/Btu.
 - 2. Energy Efficiency:
 - a. Condensing unit SEER of 12.0 for equipment 20 KW and below. Provide EER of 11.0 for equipment above 20 KW.
 - 3. Hazards:
 - a. Where maintenance personnel could be exposed to chemicals during routine maintenances and repair, furnish all personal safety equipment and clothing necessary for adequate protection.

PRODUCTS

- A. Refrigeration Units:
 - 1. Use of or more of the following:
 - a. Condensing units.
 - b. Packaged terminal air-conditioners.
 - c. Packaged air cooled chillers.

END OF SECTION

AIR DISTRIBUTION

PERFORMANCE

- A. Basic Function:
 - 1. Distribution air to maintain the required space conditions.
 - 2. Where air distribution elements also function as elements defined within another element group, meet the requirements of both element groups.
 - 3. In addition to the requirements of this chapter, comply with all applicable requirements of the **Facility Performance** Chapter, **Service** Chapter, **HVAC - Heating, Ventilating, and Air Conditioning** Section and **HVAC Controls** Section.
- B. Amenity and Comfort:
 - 1. Space Temperature Control: Coordination of air distribution system's design and installation with zoning and space temperature requirements specified in the **HVAC Controls** Section.
 - a. Maintain winter effective temperature as defined by ANSI/ASHRAE Std 55-1992 with Addendum between 68 degrees F and 74 degrees F.
 - b. Maintain summer effective temperature as defined by ANSI/ASHRAE Std 55-1992 with Addendum between 73 degrees F and 79 degrees F.
 - 2. Air Movement:
 - a. Provide an air distribution system that limits the air velocity to 50 fpm, maximum.
 - b. Adjustments: Provide an air distribution system which allows adjusting direction of airflow from supply diffusers, adjusting dampers, and changing the thermostat setpoint.
 - 3. Acoustical Performance:
 - a. Air Distribution Background Noise: Provide systems which comply with
- C. Operation and Maintenance:
 - 1. Design Criteria: Design system in accordance with ASHRAE Fundamentals and Systems Handbooks and good engineering practice. Ambient design conditions shall be taken from the 0.4% column of ASHRAE Climatic design information except that air cooled equipment shall be selected based on ambient temperature of 105 deg F.
 - a. Condenser Fouling Factor: 0.0005 sq ft deg F hr/Btu.
 - 2. Energy Efficiency:
 - a. Condensing unit SEER of 12.0 for equipment 20 KW and below. Provide EER of 11.0 for equipment above 20 KW.
 - 3. Hazards:
 - a. Where maintenance personnel could be exposed to chemicals during routine maintenances and repair, furnish all personal safety equipment and clothing necessary for adequate protection.

PRODUCTS

- A. Refrigeration Units:
 - 1. Use one or more of the following:
 - a. Condensing units.
 - b. Packaged terminal air-conditioners

END OF SECTION

HVAC CONTROLS

PERFORMANCE

- A. Basic Function:
 - 1. Provide the elements necessary to control the building's indoor environment.
 - a. Provide a programmable thermostat for each single zone unit to maintain the required space conditions and local, packaged control for each major piece of HVAC equipment.
 - 2. Where control and instrumentation elements also must function as elements defined within another element group, meet the requirements of both element groups.
 - 3. In addition to the requirements of this section, comply with all applicable requirements of Chapter II - Facility Performance, Chapter III - Services, and Chapter VI - Mechanical.
- B. Amenity and Comfort:
 - 1. Zoning and Space Temperature Control:
 - a. Provide each computer room with a dedicated zone. Provide temperature control.
 - 2. Building Control System: Provide a central location to monitor and control each zone setpoint
- C. Health and Safety:
 - 1. Life Safety: Provide interconnection and coordination of HVAC controls with other life safety systems.
 - 2. Fire Sources: Provide products which are rated for the specific locations where they are installed.
- D. Durability:
 - 1. Expected Service Life Span: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
 - 2. Vandalism: Protect the system field panels from unauthorized access. Emergency shutoff switch for AHU located to be easily accessible by building occupants.
 - 3. Accidental Damage: Protect thermostats from accidental damage.
- E. Operations and Maintenance:
 - 1. System Capacity: Provide a building control system with sensors and points to perform as specified and add 50 percent more points.
 - 2. Ease of Use:
 - a. Locate field panels in electrical closets.
 - b. Locate the central controller in the maintenance office.
 - c. Provide a system which is user programmable.
 - d. Provide field panels which are independent and do not need the central controller to continue functioning.
 - 3. Ease of Service:
 - a. Provide a system of modular design.
 - 4. Energy Efficiency: Provide:
 - a. Holiday scheduling.
 - b. Night setback

- c. Outside air economizer.
- d. Chiller staging (if more than one chiller).
- e. Optimum start.
- f. Optimum stop.

PRODUCTS

A. Building Control System Types:

- 1. Use one of the following:
 - a. A programmable thermostat with a on board electronic control sequences of the unitary equipment.

END OF SECTION

FIRE PROTECTION

PERFORMANCE

A. Basic Function:

1. Provide services systems to protect life and property.
2. Fire protection comprises the following elements:
 - a. Fire Sprinkler and Extinguishing Systems: Elements which automatically extinguish fires.
 - b. Fire Detection and Alarm: Elements required to detect fires and communicate fire location to building occupants, building management, and public fire fighting agencies.
 - c. Fire Protection Specialties: Elements required for manual fire-fighting by occupants.
 - d. Other Fire Protection Elements: Elements that are not covered in other fire protection sections.
3. Provide automatic fire suppression where indicated on the drawings.
4. Water Use:
 - a. Provide a water supply to sprinkler systems that is sufficient to extinguish fires inside the structure meeting the requirements of Mil Hdbk 1008C design densities and areas.
5. Where fire protection elements also must function as elements defined within another element group, meet the requirements of both element groups.
6. In addition to the requirements of this section, comply with all applicable requirements of Chapter II - Facility Performance and Chapter III - Services.

B. Amenity and Comfort:

1. Leakage: Provide systems that are leak-free.
2. Accessibility: Provide clearances around system components for service and use.
3. Sound: Provide audible alarm system to signal building occupants of fire hazard.
4. Convenience: Provide an automatic system to signal building occupants of fire.
5. Hazards: Provide systems which minimize risk of injury and damage to property.
6. Substantiation:
 - a. Preliminary Design: Fire protection areas identified.
 - b. Design Development: Fire protection zones indicated on the drawings with riser locations identified.
 - c. Construction: Functional performance testing in accordance with code.

C. Health and Safety:

1. Path of Egress. Provide systems which safeguard path of egress.
2. Fire Source. Provide system materials which do not contribute to the spread of the fire.
3. Fire Spread: Provide systems which control spread of fire throughout facility.
4. Meet requirements of NFPA 13, NFPA 24, NFPA 72, NFPA 101, NFPA 170, NFPA 80.

D. Structural:

1. Seismic Design: Provide support systems which sustain static (dead) loads twice the wet weight of

the system.

E. Durability:

1. Corrosion Resistance: Use corrosion resistant materials; ferrous metal is not considered corrosion resistant unless R is hot dipped galvanized, chrome plated, or coated with rust inhibitive paint.
2. Vandalism: Provide systems which are tamper-resistant.

F. Operation and Maintenance:

1. Ease of Use: Provide easy access to and working clearances around system components.
2. Unauthorized Use: Provide systems which minimize activation and use by unauthorized persons.
3. Substantiation:
 - a. Preliminary Design: System layout indicating operator interface locations.
 - b. Design Development: System equipment locations indicated on the drawings and manufacturer's product data indicating products to be used.

PRODUCTS

A. Use the following:

1. Fire detection and alarm system: Provide complete, supervised, addressable fire alarm system. A looped conduit system so that all conductors within are severed at any point, all IDC, NAC, and SLC's will remain functional. SLC shall be style 6 and NAC shall be style Z I.A.W. NFPA 72. System shall meet all codes. Manual Pull station shall be locked with CAT 15 Keys. Provide radio alarm transmitters compatible with Fort Hood's Monaco D - 700 receiving equipment with all accessories (antenna) to receive alarm from FACP. Where a type of product is specified, without performance criteria specifically applicable to the element, use the type of product specified.

END OF SECTION

FIRE SPRINKLER AND EXTINGUISHING SYSTEMS

PERFORMANCE

- A. Basic Function:
 - 1. Provide fire sprinkler or fire extinguishing systems where indicated on the drawings.
 - 2. Provide sprinkler systems to match existing unless otherwise indicated or required by code.
 - 3. Provide code-required coverage.
 - 4. Fire Sprinklers: Design and construction in accordance with code and NFPA 13-1999 and UFC.
 - 5. Where fire sprinkler and extinguishing elements also must function as elements defined within another element group, meet the requirements of both element groups.
 - 6. In addition to the requirements of this section, comply with all applicable requirements of Chapter 11 - Facility Performance, Chapter III - Services, and Chapter VI - Mechanical.
- B. Amenity and Comfort:
 - 1. Accessibility:
 - a. Provide fire department connections as required by code and Mil Hdbk 1008C.
 - b. Provide interior hose stations in warehouse as required by NFPA 13.
 - 2. Appearance:
 - a. Provide spaces with the following types of sprinkler heads:
 - 1) Spaces with suspended ceilings: Recessed or semi-recessed chrome sprinklers.
 - 2) Spaces without ceilings: Upright sprinklers.
 - 3) Electrical rooms: Guarded sprinklers.
 - 4) In-rack warehouse sprinklers: Guarded upright sprinklers.
 - b. Provide hose cabinets with off-white finish and glass window in the door.
 - c. Provide valves with brass finish.
 - d. Provide fire department connections with bright-chrome finish.
 - 3. Convenience: Provide fire department connections for each standpipe as required by code.
- C. Health and Safety:
 - 1. Sprinkler Head Performance: As required by code and NFPA 13-1999.
 - a. Flammable Storage Room: Quick-response (QR) sprinklers.
 - b. Warehouse: Quick-response (QR) sprinklers.
 - 2. Water Demand Requirements:
 - a. Determine minimum water supply requirements for each sprinkler system using the hydraulic calculation method defined by NFPA 13-1999 and UFC.
 - 3. Water Source:
 - a. Provide water from a public service main.
- D. Structural:
 - 1. Seismic Design:
 - a. Provide a sprinkler system which allows movement where differential movement is

anticipated.

- b. Provide sprinkler system supports capable of supporting twice its installed wet weight.

E. Durability:

- 1. Expected Service Life Span: Provide a sprinkler system which will last a minimum of 10 years in service without major repairs or operating expense when maintained as specified in NFPA 25-1998.

F. Operation and Maintenance:

- 1. Ease of Service:
 - a. Spare Sprinkler Heads: Provide additional sprinkler heads as required by code to service the system.

PRODUCTS

A. Pipe:

- 1. Use the following:
 - a. Galvanized steel pipe, ASTM A53 or ASTM A135

B. Fittings:

- 1. Use one or more of the following:
 - a. Cast iron.
 - b. Galvanized steel.

METHODS OF CONSTRUCTION

A. Construct the system using the following methods:

- 1. 2 inch and smaller pipe, use schedule 40 pipe with threaded or welded connections.
- 2. 2 1/2 inch to 4 inch pipe, use schedule 30 or 40 pipe with threaded or welded connections or schedule 10 pipe with rolled groove connections.
- 3. Pipe larger than 4 inch, use schedule 30 or 40 pipe with rolled or cut groove connections.

END OF SECTION

FIRE DETECTION AND ALARM

PERFORMANCE

- A. Basic Function:
1. Provide complete supervised addressable automatic fire detection and automatic alarm systems as required by code.
 2. Integrated systems performing all functions are required, subject to requirements of code for separated, independent systems.
 3. Fire Alarm Control Panel shall contain a minimum of two (2) Signaling Line Circuits (SLC). SLC's shall be Class A, Style 7.
 4. Notification Appliance Circuits (NAC) shall be Class A, Style Z.
 5. A Looped Conduit System for all circuits and Fire Alarm Devices shall be provided so that a Conductor Break will not effect system operation.
- B. Health and Safety:
1. Detection, Alarm, Notification Methods: In accordance with NFPA 72-1999 and Corps Guide Spec. No. 13851.
 2. Detection:
 - a. Air Handling Units Over 2,000 cfm: Minimum of one detector in supply.
 - b. Upon detection of fire or smoke condition, automatic notification of occupants, and Ft Hood central fire station.
 - c. Provide a heat detector in the room, which houses the fire alarm control panel.
 3. Alarms:
 - a. Manual stations at minimum of 150 feet intervals along means of egress paths, and at all exterior doors.
 - b. Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.
 - c. Visual alarms, in locations required by code and public toilets and corridors.
 4. Fire Protection Controls:
 - a. Provide connections between alarm and detection system and fire suppression system activation sensors.
 - b. Upon Alarm: Shut down or deactivate the following:
 - 1) HVAC air distribution.
 - 2) Fire-rated window shutters.
 5. Audible and visual trouble notification of operations staff, for alarm zone failures, annunciator zone failures, ground faults, backup power failure, water supply equipment failures.
 6. Hard wired electrical supervision of all components required by MIL-HNDK-1008C and all tamper switches on post indicator valves. Trouble or alarm signals shall be sent to the Central fire station.
 7. Error and Failure Prevention: Addressable system; "tamper" sensors at sensitive points; products of only one manufacturer or certified by manufacturer as compatible.
 8. Fire Alarm Contractor shall be Licensed by Texas State Fire Marshall's Office.

- C. Operations and Maintenance:
 - 1. Power Supplies:
 - a. Building power for all systems.
 - b. Dedicated Battery Backup Power with Battery Charger:
 - 1) Fire safety systems, 72 hours.
 - 2) Emergency communications, 48 hours.
 - 2. Ease of Use:
 - a. One centralized monitoring display (control panel) for all systems located in mechanical room and one remote annunciator panel located in a general office area.
 - 3. Government Personnel Training:
 - a. Operational: Minimum of 8 hours, for each separate system.
 - b. Maintenance: Minimum of 8 hours, for each separate system.

PRODUCTS

- A. Control Systems for All Applications:
 - 1. Use the following:
 - a. Microprocessor-based hardware.
- B. Fire/Smoke Detectors:
 - 1. Use the following:
 - a. Photoelectric smoke detectors.
 - b. Fixed temperature heat detectors.
- C. Warning Devices:
 - 1. Use the following:
 - a. Horns.
 - b. Speakers.
 - c. Combination speaker/strobes.
- D. Communication Cabling:
 - 1. Use the following:
 - a. Copper cable, Approved by Fire Alarm Panel Manufacturer.
- E. Manual Pull Station:
 - 1. Red, Double-Action Type, with Key (CAT 15) Reset and Addressable Unit from Manufacturer.
- F. FACP: Rec, "Notifier" or Equal Panel.
- G. LED Graphic Annunciator at Front Entrance with Architectural Plan of Bldg.
- H. All Tamper and Flow switches shall be Addressable with Monitor Modules.
- I. Provide Radio Alarm Transmitter for each FACP that is Compatible with Post Monaco D700 Base Station. Transmitter shall be complete with Antenna, Backup Battery Power, and set at Post Frequency.

END OF SECTION

FIRE PROTECTION SPECIALTIES

PERFORMANCE

- A. Basic Function:
 - 1. Provide equipment and fixtures to facilitate manual fire-fighting in accordance with the code.
 - 2. Fire protection specialties comprise the following elements:
 - a. Fire extinguishers.
 - b. Combination extinguisher and hose cabinets.
 - 3. Provide portable fire extinguishers throughout the facility, of the type and size and in the locations required by NFPA 10-1998 and the code.
 - 4. Where fire protection specialty elements also must function as elements defined within another element group, meet the requirements of both element groups.
 - 5. In addition to the requirements of this chapter, comply with all applicable requirements of Chapter II - Facility Performance, Chapter III - Services, and Chapter VI - Mechanical.
- B. Amenity and Comfort:
 - 1. Appearance: Extinguishers installed in wall-mounted brackets are not acceptable in appearance except in SU Spaces.
- C. Health and Safety:
 - 1. Accident Prevention:
 - a. Locate extinguishers and Cabinets so that means of egress is not impeded, in accordance with code.
 - 2. Fire Safety: Mount extinguishers in permanent location using mounting fixtures that will inhibit casual removal but allow ready use in case of fire.
- D. Durability:
 - 1. Expected Service Life Span: Same as life span of building.
 - 2. Durability: As specified for interior fixtures.
- E. Operation and Maintenance:
 - 1. By-Products: Select extinguishing agent to minimize adverse effects of use on building equipment and finishes.
 - 2. Ease of Alteration: Locate extinguishers and cabinets so that minor relocation of rooms and spaces normally expected during occupancy by the same tenant do not result in violabon of the location requirements of NFPA 10-1998.

PRODUCTS

- A. Fire Extinguishers:
 - 1. Use one of the following:
 - a. Type required by Fort Hood Fire Safety Office.
- B. Cabinets:
 - 1. Use one of the following:
 - a. Painted steel cabinets.
 - b. Aluminum cabinets.

- c. Aluminum cabinets.
- d. Stainless steel cabinets.
- e. Cabinets with vision panels.

END OF CHAPTER VI

CHAPTER VII

ELECTRICAL

A. References

1. The current adopted publications, codes, specifications and standards shall be used as the basic for the project design and shall include, but not be limited to the following:

ANSI C2	National Electrical Safety Code, 2002
NFPA 70	National Electrical Code (NEC), 2002
NFPA 72	National Fire Alarm Code, 2002
NFPA 75	Standard for the Protection of Electronic Computer/Data Processing Equipment, 2003
NFPA 101	Life Safety Code
IES HANDBOOK	Illuminating Engineering Society Handbook
LIGHTING STANDARDS	Corps of Engineers Standard Lighting Fixture Details Drawing Series No. 40-06-04 http://cadlib.wes.army.mil CADD Details Library, Electrical Details
DISTRIBUTION STANDARDS	USACE Standard Details 40-06-04, Oct. 97 Corps of Engineers Standard Electrical Distribution Details. http://cadlib.wes.army.mil CADD Details Library, Electrical Details
ETL 94-2	Electrical Service and Distribution
ETL 90-6	Utility Meters in New and Renovated Facilities
ETL 91-5	Electrical System Grounding: Static Grounding and Lightning Protection
UFC 3-600-1	Fire Protection Engineering Criteria – Emergency Lighting and Marking of Exits
ANSI TIA/EIA-569-A	Fire Protection Engineering for Facilities
USACE	Commercial Building Standard for Telecommunications Pathways and Spaces
	Fort Worth District – Fort Hood Requirements & Information: http://www.swf.usace.army.mil/pubdata/ed/elect/fthood/fthood.asp#intcom

B. Standard Products:

1. Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted.

C. Coordination of Electrical Criteria:

1. All electrical criteria provide in these general notes shall be coordinated with architectural, mechanical, fire protection, structural, interior design, and all other project requirements not mentioned here. The number and location of all electrical equipment indicated in the electrical requirements are approximate. Contractor design shall meet the intent of the electrical requirements provided in this section. Contractor shall coordinate the final locations of all electrical equipment with the FORT HOOD USERS to be provided by the Contracting Officer in the Field after the award of this contract.

D. Exterior Underground Primary Electrical Requirements:

1. Medium Voltage Cables:
 - a. The primary cable shall be 133 percent insulated copper conductors (EPR) in concrete encased duct. Main conductors shall be no less than #4/0 A.W.G. Tap conductors shall be no less than #1/0 A.W.G. Minimum burial depth shall be 1066.8mm (3'-6") below finished grade. EPR cable insulation shall conform to the requirements of NEMA WC 8 and AEIC CS6. A 600 volt neutral shall also be installed in the same duct as the primary feeder and grounded at the pad mounted transformer.
2. Terminations and Splices:
 - a. All primary load break elbows and termination kits shall be rated 15 kV and shall be 3M type. No splices shall be allowed in manholes, instead an above ground switch (see paragraph above) shall be located at the needed splice. If a splice is allowed in special circumstances, then it shall be rated at 15 kV.
3. Pad-mounted Tamperproof Compartmental Transformers:
 - a. The pad mounted transformer shall be a 12470 volt, three phase, delta-wye; oil-immersed unit (non-PCB), outdoor type with copper windings and conductors. Aluminum is not acceptable. Facility transformer shall be sized to have a minimum of 25% spare capacity above the estimated maximum demand for the building. Facility transformer shall be derated for altitude. The transformer shall be looped fed, dead front, internally fused with the lightning arrestors installed on the loop feed with load-break elbows. See Exterior Underground Secondary Electrical Distribution Requirements for pad transformer secondary distribution voltages. Transformer pad shall extend 254.0mm (10") beyond the edge of the transformer furnished. Provide grounding conductor counterpoise around transformer pad and a grounding rod at each corner of the counterpoise with a minimum of two ground connections between the transformer and the counterpoise.

E. Exterior Underground Secondary Electrical Distribution Requirements:

1. Exterior secondary electrical distribution system to the facilities shall be 208Y/120 volt, 3-phase, 4-wire underground feeder in conduit to a Main Distribution Panel (MDP)/Panelboard located in the electrical room. Main facility feeder and main distribution panel shall be sized to have a minimum of 25% spare capacity above the estimated maximum demand for the building. Design of the exterior secondary electrical system shall be in accordance with Electrical Distribution System, Underground - SECTION 16375 and the requirements of this section. Service entrance conductors, branch and feeder circuits shall be single conductor conductors, Type THW, THWN, or USE in accordance with NFPA 70. Service entrance conductors and underground feeder/branch circuits shall be copper conductors with insulating grounding conductor in conduit. Aluminum conductors and direct buried cables are NOT acceptable. Conduits shall be rigid galvanized steel (RGS). Conduits shall be non-encased direct-burial for low voltage circuits. Top of conduit shall be 609.6mm (24") below finished grade.

F. Interior Electrical Distribution System:

1. The interior secondary distribution voltage within the building shall be 208Y/120 volt, 3-phase, 4-wire. Conductors shall be copper. Aluminum is not acceptable. The higher voltage (208 volts) shall be used for larger motor loads, equipment loads and all other required loads. The lower voltage (120 volts) shall be used for all the lighting loads. Transformer windings and conductors shall be copper. Aluminum is not acceptable. Transformers that serve non-linear loads such as the computer receptacles shall have K-rated transformers. Contractor shall provide the most economical secondary system to meet the requirements of this section. Design shall be in accordance with Electrical Work, Interior - Specification SECTION 16415 and the requirements of this section. Service equipment/disconnecting means shall be provided in the Main Distribution Panel (MDP)/Panelboard/(s) located in the electrical rooms. Service equipment/disconnecting

means shall be wall mounted. Service disconnect means shall be of the bolted circuit breaker type. Secondary surge protection shall be provided at the Main Distribution Panel.

- a. Main Distribution Panel (MDP)/Panelboard(s): Main Distribution Panel (MDP)/panelboard(s) shall be in a metal-enclosure with molded circuit breakers. Enclosure shall be ventilated general purpose type wall mounted type. Busses for the Main Distribution Panel (MDP) and all panelboard/(s) shall be copper only. Aluminum shall not be allowed. Each phase, neutral and equipment grounding bus shall be clearly shown on the drawings. Short circuit rating of all busses shall be clearly indicated on the drawings.
 - b. KWHR Meter: Metering shall comply with Engineering Technical Letter (ETL) 94-2: Utility Meters in New and Renovated Facilities. KWHR meters with 15 minute demand registers shall be provided for recording power consumption of the facility. Meters shall be provided with pulse initiators for connection to the BASE FORT HOOD EMCS - (Energy Monitoring and Control System).
 - c. Protective Coordination Study: A full protective coordination study to include overcurrent and short current analysis shall be done on the electrical distribution system for the building. The study shall include the interior electrical distribution system and primary distribution system back to the existing primary line.
2. Panelboards:
- a. Lighting and appliance branch-circuit panelboards shall be of the circuit breaker conforming to NEMA AB-1 and UL 489 and shall be located in the electrical room. Load-center type panelboards shall not be allowed. Panelboard shall not exceed 1981.2mm (78") in height from the finished floor. All panelboards shall have a minimum of 25 percent spare capacity for all loads. Panelboards shall have a minimum of 25 percent spare circuit breakers. Spare circuit breakers shall be redundant of the type of circuit breaker being provided in the panelboard. Panelboard busses shall be copper only. Aluminum busses are not acceptable.
3. Motors:
- a. Motors shall be of sufficient size for the duty to be performed and shall not exceed the full-loading rating when the driven equipment is operating at specified capacity under the most severe conditions encountered. All motors shall have open frames and continuous-duty classification and be based on a 40 degree C ambient temperature reference. All motors shall be derated for altitude where applicable. All permanently wired polyphase motors of 747 watts or more shall meet the minimum full-load efficiencies as indicated in the Electrical Work, Interior Specification Section 16415.
4. General Purpose Receptacles
- a. Duplex receptacles for general purpose applications shall be 20 amp, 125 volt, 2-pole, 3-wire grounding type. A maximum of five duplex receptacles may be connected to a receptacle circuit. Receptacle circuits shall not supply lighting loads. General purpose duplex receptacles shall be located in accordance with the matrix provided per the Device Installation Guide Matrix at the end of this document.
5. Computer Outlets:
- a. Computer outlets shall be duplex, 20 amp, 125 volt, 2-pole, 3-wire grounding type receptacles. A maximum of three duplex computer outlets shall be connected to a receptacle circuit. Circuits shall be sized using 600 volt-amp per computer. Neutral conductors shall be sized at 133% of the phase conductors. Computer outlets shall be labeled as "COMPUTER". Mount the outlets 381mm (15") above finished floor. Computer outlets shall be mounted adjacent to the Telephone/Data outlets. Maintain a

separation of 152.4mm (12") from the Telephone/Data outlets. Exact location of all Computer Outlets shall be verified and coordinated with the FORT HOOD USERS during the design of the project.

- b. Architectural/Mechanical Connections: Contractor shall provide branch circuits, disconnect switches, magnetic starters, and all other related electrical equipment and material for all architectural, mechanical equipment and environmental equipment to be installed in the project (includes the facility and site). This shall include all hair dryers, HVAC units, unit heaters, pumps, exhaust fans, and all other mechanical equipment in the facility. Contractor shall coordinate this electrical requirement with the architectural and mechanical requirements.

G. Interior Lighting System:

- 1. The interior design shall be in accordance with the requirements in the Device Installation Guide Matrix at the end of this document, the IES Handbook, the "Electrical Work, Interior" Specification - SECTION 16415. Illumination levels shall be determined as noted in the general notes and per reference criteria specified within these documents, holding to the more stringent. Fluorescent light fixtures shall employ 32 watt, T8, 75 CRI (minimum), 15,000-hour life, 2500 lumen output lamps. Fluorescent fixture ballasts shall be 2 or 4 lamp rated with a minimum power factor of 0.95, a minimum ballast factor of 0.75, a minimum ballast efficacy of 0.75, a total harmonic distortion (THD) of less than 10%, and a starting temperature of 0-degree F. Occupancy sensors shall be provided for all office spaces, conference rooms, and storage rooms as noted below:
 - a. Individual Offices: wall or ceiling mount, passive infrared occupancy sensor, 120 degree coverage for wall mount, 360 degree coverage for ceiling mount.
 - b. Multiple User Offices (unobstructed): ceiling mount, passive infrared occupancy sensor, 360 degree coverage.
 - c. Multiple User Office Space (cubicles): ceiling mount, dual technology passive infrared and ultrasonic occupancy sensor, 360-degree coverage.
 - d. Conference Rooms: ceiling mount, passive infrared occupancy sensor, 360-degree coverage.
 - e. Large Storage Rooms: ceiling mount, dual technology passive infrared and ultrasonic occupancy sensor, 360-degree coverage.
- 2. Egress and Exit Lighting Fixtures:
 - a. Egress and exit lighting design shall be in accordance with NFPA 101. Egress and exit lighting fixtures shall be powered from a central battery/inverter system located in the electrical room to meet FORT HOOD USER requirement. Exit lights shall be LED type XL1 - Corps of Engineers Std. Det. Dwg. No. 40-06-04. Egress lighting fixtures shall be provided from room fluorescent light fixtures through out the facility.

H. Interior Communication System:

- 1. All telephone/data outlets shall be provided with three 8-position jacks (RJ45). Connect all telephone/data outlets from the telephone terminal backboard in the communications room with three 4-pair, EIA/TIA Category 6, unshielded twisted pair (UTP) solid copper station cable. Connect all single 8-position type wall outlets from the telephone terminal backboard with one 4-pair, EIA/TIA Category 6, UTP solid copper station wire. All electronic devices (computers, file servers, hubs, concentrators, phones, etc.) are not part of this contract and will be installed by the USER. Each facility design shall be in accordance with Premises Distribution System Specification - SECTION 16710, Electrical Work, Interior Specification SECTION 16415.

I. Telephone Terminal Backboard:

1. Provide a 19.05mm (3/4") plywood backboard in a NEMA 1 steel enclosure on the wall in the Electrical/Communications Room. Provide surge arrestors and 110 type cross connect blocks for the incoming telephone conductors. The plywood telephone backboard shall be provided with a fire retardant coating. Contractor shall coordinate location of incoming telephone service with the location of the surge arrestors and cross connect blocks on the telephone backboard. All underground conduits entering the Communication Room shall be stubbed up 152.4mm (6") above finished floor adjacent to the telephone backboard. Provide 101.6mm (4") galvanized rigid steel conduit for protection of 25 pair telephone cable where exposed on walls in the Electrical/Communications Room.
- J. Telephone Conductors/Conduits:
1. Copper cables shall be 24 gauge, 4 pair, EIA-TIA 568B Category-6, unshielded twisted pair (UTP) solid copper station cable. Terminate cables on jacks with EIA 568B sequencing. All telephone conductors shall be installed in conduits per Wiring Methods paragraph in this section.
- K. Telephone/Data Outlets:
1. Telephone/data outlets shall consist of two (2) telephone jack and two (2) data jacks. Telephone jacks and data jacks shall be installed in the same junction box. Telephone jacks shall be used for voice communication and data jacks shall be used for data communication. Telephone jacks shall be blue in color and labeled as "VOICE". Data jacks shall orange in color and labeled as "DATA". Each outlet shall be mounted 381mm (15") above finished floor. Provide telephone/data outlets at each of the locations indicated in Device Installation Guide Matrix.
 2. LAN Rack:
 - a. Contractor shall provide a 19"W x 24"D x 4'H LAN rack in each Communication Room addressed by this contract.
 3. Cross Connect Cables:
 - a. Provide 25 pair #24 AWG telephone cables with 50 pin connectors at each patch panel and punch down the other end of the cable at the cross-connect blocks. Support all telephone cables by ladder cable trays in the Electrical/Communications Room.
 4. Fiber Optic Patch Panels:
 - a. Fiber optic patch panels for single-mode fiber shall be rack mountable with 12 "ST" type connectors.
- L. Communication Grounding:
1. All exposed non-current carrying metallic parts of the telephone equipment, cable sheaths, cable splices and terminals shall be grounded. Contractor shall provide a Master Ground Bus (MGB) in the Electrical/Communication Room per Premises Distribution System - Specification Section 16710.
- M. Community Antenna Television (Catv):
1. Provide "F" style CATV jacks at locations noted on plans and as identified in the Device Installation Guide Matrix at the end of this document.
- N. Wiring Methods:
1. Wiring shall conform to NFPA 70, Electrical Work, and Interior Specifications SECTION 16415.
- O. Power Conductors:
1. Conductors shall be copper only. Aluminum conductors are not allowed. Minimum conductor size shall be #12 A.W.G. Conductors shall be installed in conduits. Power and lighting conductors shall be 600 volt, Type THHN (in dry locations), and THW or THWN (in wet locations). Cabling systems such as Mineral-Insulated cables, metallic armored cables and nonmetallic-sheathed

cables shall not be allowed on this project.

P. Communication Conductors:

1. Communication conductors shall be provided per Ft. Hood communications standards.

Q. Conduits:

1. Wiring shall consist of insulated conductors installed in rigid aluminum conduit, rigid zinc-coated steel conduit, electrical metallic tubing or intermediate metal conduit. Plastic conduit is allowed only underground or under the floor slab. Raceways shall be concealed within finished walls, ceilings, and floors.

R. Grounding System:

1. The grounding system shall be designed in accordance with NEC Article 250 and the following criteria. In general, all metallic building components including reinforcing steel and miscellaneous metals shall be part of an electrically continuous ground system. Steel studs used in interior wall construction, T bars of the ceiling grid, diffusers of the air distribution system, and door hardware are exempt from this bonding requirement. Bonding shall be by exothermic welding or the brazing of a copper wire between components. Design shall be in accordance with Electrical Work, Interior Specification - SECTION 16415.
2. Communication Grounding System:
 - a. Grounding for the main telephone service shall be provided by installing an insulated #6 copper grounding conductor in 27mm (1") conduit from the Master Grounding Bus (located in the Electrical/Communication Room) to the building service ground.
3. Grounding Conductors:
 - a. A green equipment grounding conductor, sized in accordance with NFPA 70 shall be provided, regardless of the type of conduit. Equipment grounding bars shall be provided in all panelboards. The equipment grounding conductors shall be carried back to the service entrance grounding connection or separately derived grounding connection. Grounding conductors shall be provided in all branch (including lighting circuits) and feeders circuits.

S. Earth Electrode System:

1. The maximum resistance measure in accordance with IEEE Std 81 of a driven ground rod shall not exceed 25 ohms under normally dry conditions. Ground rods shall be 19.05mm (3/4") x 3048mm (10') copper clad ground rods.

T. Fire Detection And Alarm System:

1. The fire detection and alarm system requirements are provided in the Device Installation Guide Matrix. Design shall be in accordance with Fire Detection and Alarm Specification, Addressable - SECTION 13851 and the requirements of the Fire Protection portion of this contract. Fire alarm system shall be addressable to each device. Alarms shall sound/flash local to the facility and also report back to the FORT HOOD Fire Department.

U. Testing:

1. Contractor shall provide all testing required by all specifications provided to the Contractor. Testing shall include low voltage conductors, and communication conductors and all other mandatory testing required by the specifications provided with this section.

V. Training:

1. Training courses shall be conducted for five (5) operating staff members designated by the Contracting Officer in the maintenance and operation of the Fire Alarm System. A training day is defined as eight (8) hours of classroom instruction, including breaks and lunchtime, Monday

through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, the Contractor shall assume that the attendees will have a high school education or equivalent, and are familiar with the systems. No training will be scheduled until training manuals and O&M manuals have been approved by the Government. The course shall be taught at the project site for a period of four (4) training days. The training courses shall cover all the material contained in the Operating and Maintenance Instructions, the layout and location of each system and shall include the following for each system: preventive maintenance, troubleshooting, diagnostics, calibration, adjustment, commissioning, and repair procedures. Typical systems and similar systems may be treated as a group, with instruction on the physical layout of one such system.

W. Technical Specifications:

1. Government provided technical guide specifications shall be completely edited and fully coordinated with the drawings to accurately and clearly identify the product and installation requirements for the project. The provided specifications define the minimum requirements for items of equipment, materials, installation, training, operating and maintenance instructions, O&M manuals and testing that shall be provided for the project. Where items of equipment, materials, installation, training, operating and maintenance instruction, O&M manuals or testing requirements are not covered in the provided specifications, special sections within each guide specification shall be prepared to cover those subjects. Specific items of equipment identified in the provided specifications but not required for the project shall be edited out. Government approval is required for any specification addition or deletion. As a minimum the following specifications shall be provided:
 - a. Fire Detection And Alarm System, Addressable - Section 13851
 - b. Electrical Distribution System, Aerial - 16370
 - c. Electrical Distribution System, Underground - Section 16375
 - d. Electrical Work, Interior - Section 16415
 - e. Premises Distribution System - Section 16710
 - f. Telephone System, Outside Plant - Section 16711

END OF CHAPTER VII

INDEX OF SPECIFICATIONS

The following index of U. S. Army Corps of Engineers specifications are provided as a guide only and may not represent all specifications sections required to complete the renovation scope of work indicated on these drawings. Construction specifications are the Contractor's developed construction specifications conforming to the requirements in Section 01012 – DESIGN AFTER AWARD.

03100A	STRUCTURAL CONCRETE FORMWORK
03200A	CONCRETE REINFORCEMENT
03301A	CAST-IN-PLACE STRUCTURAL CONCRETE
03340A	ROOF DECKING, CAST-IN-PLACE LOW DENSITY CONCRETE
04200	MASONRY
05310	STEEL DECKS
05400	COLD-FORMED METAL FRAMING
05500A	MISCELLANEOUS METAL
06100A	ROUGH CARPENTRY
06200A	FINISH CARPENTRY
06410A	LAMINATED CLAD ARCHITECTURAL CASEWORK
07220	ROOF AND DECK INSULATION
07511	ASPHALT BUILT-UP ROOFING
07530	ETHYLENE PROPYLENE DIENE MONOMER (EPDM) ROOF MEMBRANE
07600	FLASHING AND STEEL METAL
07840	FIRESTOPPING
07920	JOINT SEALANT
08110	STEEL DOORS AND FRAMES
08210	WOOD DOORS
08330A	OVERHEAD ROLLING DOORS
08510	STEEL WINDOWS
0852A	ALUMINUM AND ENVIRONMENTAL CONTROL ALUMINUM WINDOWS
08710	DOOR HARDWARE
08800	GLAZING
09250	GYPSUM BOARD
09510	ACOUSTICAL CEILINGS
09650	RESILIENT FLOORING
09680	CARPET
09915	COLOR SCHEDULE
10153	TOILET PARTITIONS
10605	WIRE MESH PARTITIONS
10800	TOILET ACCESSORIES
13851A	FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE
13930A	WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION
15080A	THERMAL INSULATION FOR MECHANICAL SYSTEMS
15181A	CHILLED AND CONDENSER WATER PIPING AND ACCESSORIES
15190A	GAS PIPING SYSTEMS
15400A	PLUMBING, GENERAL PURPOSE
15556A	FORCED HOT WATER HEATING SYSTEMS USING WATER AND STEAM HEAT EXCHANGERS
15569A	WATER AND STEAM HEATING: OIL, GAS OR BOTH; UP TO 20 MBTUH
15620A	LIQUID CHILLERS
15700A	UNITARY HEATING AND COOLING EQUIPMENT
15895	AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM
15940A	OVERHEAD VEHICLE TAILPIPE (AND WELDING FUME) EXHAUST REMOVAL
15950A	HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) CONTROL
15990A	TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS
15995A	COMMISSIONING OF HVAC SYSTEMS
16370A	ELECTRICAL DISTRIBUTION SYSTEM, AERIAL

16375A	ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND
16415A	ELECTRICAL WORK, INTERIOR
16710A	PREMISES DISTRIBUTION SYSTEM
16711A	TELEPHONE SYSTEM, OUTSIDE PLANT
16815A	CABLE TELEVISION PREMISES DISTRIBUTION SYSTEM

END OF INDEX OF SPECIFICATIONS